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CHAPTER 2

Changes in Income Inequality

1 *Measurement of Income Inequality*

Measures of income inequality are expected to show how far distributions of income deviate from perfect equality, i.e., a state of affairs where all incomes are of the same size. The income-receiving unit may be defined in various ways, and the particular definition adopted must serve as a frame of reference when one attempts to appraise the implications of 'perfect equality' or any deviation from it. In the Financial Survey the income recipient was a family, comprising any number of earners and dependents, and varying in age, sex, and racial composition. In our analysis, therefore, it is convenient to interpret perfect equality of income as *perfect equality of family income*. Obviously, this definition admits of a certain degree of inequality in terms of per capita income, income per earner, or income per some standard person.

What is perfect inequality? The extreme instance is the situation in which one recipient absorbs the community's entire positive income, and no one else has any income at all. Measures of income inequality should take on minimum values in the case of perfect equality, maximum values in the case of perfect inequality.

Observed income distributions do not, of course, follow either extreme. How then is the *degree* to which they approach the extremes to be measured? There is no unique solution. Of the numerous possible methods of measurement, two were chosen for the purpose of this study: the first is based on the standard deviation (σ); the second on the mean difference (t) of the income distribution;[1] it is the sum of all possible differences between the incomes in the distribution, regardless of sign, divided by the number of such differences.

Both measures use the numerical values of all incomes distinguished in the material and are easy to calculate. The standard deviation is a useful statistical tool, of special interest because of its

[1] Various measures of income inequality are discussed by D. B. Yntema in 'Measures of the Inequality in the Personal Distribution of Wealth or Income', *Journal of the American Statistical Association*, Dec. 1933; and L. von Bortkiewicz in 'Die Disparitätsmasse der Einkommenstatistik', *Bulletin de l'Institut International de Statistique*, Vol. 25; 3, 1931.

For the formulae and a more detailed discussion of the inequality measures used in this study, see Appendix C.

high sampling stability. However, in the present case of nonnormal distributions, the standard deviation may well have lower sampling stability than other measures of dispersion; nor does it carry the simple connotation that attaches to it in the case of a normal distribution, viz., that about two-thirds of the observations fall within the limits $\pm \sigma$ measured from the mean. The behavior of the mean difference in sampling is unknown, but it carries a simple connotation—everyone compares his income with that of everyone else, and the larger the average difference between incomes the greater the inequality.

In adopting these two approaches we consider the degree of income inequality as an increasing function, once, of the standard deviation, then, of the mean difference. The measures σ' and t', computed as they were from grouped data, i.e., distributions of income over income *groups*, are approximations, or rather understatements, of the true measures that could have been computed if individual family incomes had been given.

Income dispersion can be measured in 'absolute' terms, i.e., in units of income (dollars), and in 'relative' terms, i.e., as a fraction of the general income level. Although we applied both measurements, our interest is focused chiefly on relative dispersion, as has been customary in studies of income inequality *per se*.[2] In the discussion to follow, the term 'inequality' is used in the sense of relative dispersion.

The measures of relative dispersion corresponding to the standard deviation and mean difference are the *coefficient of variation* (v') and the *coefficient of concentration* (R').[3] The latter has a convenient graphical counterpart in the Lorenz diagram, which shows the relation between the cumulative percentages of income and of income recipients among the various income groups. The coefficient of concentration is the ratio of the area between the Lorenz curve and the 'line of perfect equality' to the area of the triangle formed by the axes and the 'line of perfect equality' (App. C 2). Under conditions of perfect equality both coefficients are zero.

In the case of perfect inequality the coefficient of concentration

[2] However, studies of income inequality for certain specific purposes may require measures of absolute dispersion; for instance, the second moment of the income distribution. See Jacob Marschak, 'On Combining Market and Budget Data in Demand Studies; a Suggestion', *Econometrica*, Oct. 1939, and 'Personal and Collective Budget Functions', *Review of Economic Statistics*, Nov. 1939.

[3] If we call the arithmetic mean of incomes $\bar{x}$, $v' = \sigma'/\bar{x}$; and $R' = t'/2\bar{x}$.

reaches + 1, while the coefficient of variation becomes $\sqrt{N}$, where N is the number of income recipients.[4]

Obviously these measures of income dispersion, together with the measures of income level, do not exhaust the information contained in empirical income distributions. Two distributions with the same mean and standard deviation (or mean difference) may have different skewness and kurtosis. In this study we have refrained from investigating changes in skewness and kurtosis by means of any of the measures ordinarily used for these aspects of distribution.[5] Instead, we have supplemented our measures of income dispersion in the aggregate distributions by inspection of comparable Lorenz curves and measures of changes in the *components* of income dispersion.

2 *Changes in Aggregate Income Distributions*[6]

a FINANCIAL SURVEY

In terms of coefficients of variation the samples for the 33 cities provide a fairly consistent picture of increasing income inequality during the Great Depression (Table 6). In 27 entire-city samples, the coefficient of variation is higher for 1933 than for 1929. Decreases occur in 6 cities: Lincoln, Little Rock, Portland (Maine), Richmond, Salt Lake City, and San Diego. In the tenant samples, the tendency for the coefficients of variation to increase during the depression is even more general; there are only 3 exceptions (San Diego, Seattle, and Topeka). Among owners, 26 cities show increasing coefficients; decreasing coefficients appear in the same 6 cities as in the entire-city samples, and in St. Paul.

From a statistical viewpoint, most of the *increases* in the coefficients of variation are significant; that is, in most cases there is less than a 5 per cent probability that the observed difference between

[4] Both these upper limits are correct only if income is defined as an entity that cannot be negative. No negative incomes are shown by the Financial Survey.

[5] Preliminary analyses of the skewness [s = (Mean Income-Median Income)/Standard Deviation], carried out for 10 cities, indicate *positive* skewness, as usual for distributions of income, i.e., an excessive right tail of the distribution. Changes in the degree of skewness 1929–33 do not show a consistent direction in our various samples. For tenants we observe 8 increases and 2 decreases, for owners 3 increases and 7 decreases, for the entire-city sample 6 increases and 4 decreases. Many of these changes are without statistical significance.

[6] For entire-city, tenant, and owner samples, changes in dispersion were analyzed by coefficients of variation and of concentration. To limit the computations only the coefficients of concentration were used for the subsamples by type of canvass.

TABLE 6

Standard Deviation and Coefficient of Variation, 1929 and 1933

Identical Samples: Entire-city, Tenant, Owner-occupant

	ENTIRE-CITY				TENANT				OWNER-OCCUPANT			
	Standard deviation (dollars)		Coefficient of variation		Standard deviation (dollars)		Coefficient of variation		Standard deviation (dollars)		Coefficient of variation	
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Atlanta	1,941	1,428	1.092	1.168*	1,382	1,065	.978	1.102*	2,690	1,922	.995	1.025
Birmingham	1,750	955	1.057	1.099*	1,491	825	1.042	1.103*	2,219	1,193	.979	.994
Boise	1,256	993	.748	.813*	1,012	866	.641	.727*	1,508	1,138	.832	.899
Butte	1,929	1,316	.952	1.239*	1,515	1,123	.805	1.120*	2,446	1,576	1.084	1.365*
Cleveland	2,177	1,460	1.044	1.180*	1,679	1,124	.907	.986*	2,768	1,878	1.123	1.348*
Dallas	1,878	1,329	.891	.931*	1,313	950	.713	.755*	2,589	1,832	1.009	1.068
Des Moines	1,714	1,325	.905	1.009*	1,148	918	.673	.768*	2,249	1,703	1.052	1.162*
Erie	1,574	1,069	.896	1.103*	1,251	921	.776	1.011*	1,913	1,250	.981	1.194*
Indianapolis	2,298	1,548	1.001	1.045	1,742	1,236	.879	.957*	3,024	1,968	1.043	1.068
Lansing	1,525	1,035	.803	.969*	1,146	753	.670	.781*	1,888	1,298	.880	1.077*
Lincoln	2,106	1,265	1.076	.984	1,222	1,004	.728	.854*	2,790	1,511	1.223	1.071
Little Rock	2,072	1,221	1.101	1.071	1,219	900	.819	.963*	2,949	1,536	1.138	1.020
Minneapolis	1,745	1,234	.876	.914*	1,409	986	.792	.804	2,104	1,505	.913	.984*
Oklahoma City	1,949	1,286	.948	1.009*	1,361	866	.772	.794	2,642	1,779	1.024	1.111*
Peoria	1,872	1,314	.964	1.010	1,277	989	.755	.857*	2,305	1,585	1.041	1.084
Portland, Me.	2,044	1,399	.979	.958	1,333	1,019	.745	.787	3,047	1,967	1.099	1.068
Portland, Ore.	1,494	1,046	.872	.999*	1,081	838	.728	.927*	1,845	1,232	.925	1.008*
Providence	1,912	1,443	1.001	1.097*	1,408	986	.848	.865	2,471	1,995	1.056	1.235*
Racine	1,539	919	.860	1.051*	1,247	872	.754	1.052*	1,818	999	.938	1.081*
Richmond	1,974	1,452	1.035	.996	1,398	1,122	.905	.926	2,746	1,892	1.003	.938
Sacramento	1,739	1,325	.829	.886*	1,223	1,028	.654	.757*	2,351	1,709	.954	.997
St. Joseph	1,745	1,316	.977	1.002	1,332	1,098	.843	.911	2,202	1,575	1.044	1.062
St. Paul	1,693	1,203	.960	.964	984	816	.656	.779*	2,198	1,494	1.067	1.014
Salt Lake City	1,957	1,204	1.001	.973	1,433	987	.842	.893*	2,412	1,406	1.063	1.001
San Diego	1,677	1,042	.906	.816	1,372	913	.794	.751	2,058	1,206	1.005	.878
Seattle	1,734	1,073	.892	.906	1,517	932	.841	.838	1,943	1,241	.917	.974*
Springfield, Mo.	1,380	1,041	.893	.993*	1,029	819	.755	.886*	1,679	1,230	.955	1.032
Syracuse	1,847	1,384	.936	1.092*	1,027	826	.618	.756*	2,556	1,918	1.044	1.251*
Topeka	1,683	1,197	.953	.976	1,323	892	.845	.833	1,941	1,425	.980	1.024
Trenton	1,349	941	.854	.914*	985	780	.731	.873*	1,625	1,054	.886	.892
Wheeling	1,306	976	.876	.985*	1,079	807	.760	.851*	1,570	1,186	.985	1.127*
Wichita	1,600	1,095	.864	.961*	1,161	887	.685	.837*	2,117	1,360	1.009	1.076
Worcester	2,122	1,531	1.034	1.052	1,418	1,096	.826	.888*	3,014	2,123	1.082	1.096

* Statistically significant change in the coefficients of variation 1929–33.

coefficients would have appeared in random samples of the same size, the true difference being zero. Significant increases occur in 20 entire-city, 24 tenant, and 13 owner samples marked by asterisks in Table 6, Columns 4, 8, and 12.[7] The majority of *declines* in the coefficients of variation are insignificant. Significant declines occur in Little Rock (owners), Lincoln (owners and entire-city), and San Diego (tenants, owners, and entire-city). In the third alone are the coefficients significantly lower for both tenure groups and the entire city in 1933 than in 1929.

The increase in income inequality just established is an increase in *relative* dispersion. Without a single exception, standard deviations decline from 1929 to 1933; that is, income dispersion in dollar terms declines with a drop in mean income. The predominant increase in the coefficient of variation simply reflects the smaller proportionate declines in most of the standard deviations than in the corresponding mean incomes (Chart 3). All except 6 points lie below the line that indicates equal proportional changes in mean income and standard deviation.

The increase in income inequality is brought out even more

[7] The significance tests referred to in this paragraph are subject to two sorts of bias which offset each other to an unknown extent. The significance of the differences between the sample coefficients of variation was tested by means of the standard error formula:

$$\sigma_v = \frac{v}{\sqrt{N}}\sqrt{\frac{1}{2} + v^2}\,.$$

The more complete formula: $\sigma_v = \frac{v}{\sqrt{N}}\sqrt{\frac{1}{2} + v^2 - \sqrt{2}\, v\, r_{\sigma\bar{x}}}$

involving the correlation between σ and $\bar{x}$ in the population ($r_{\sigma\bar{x}}$) was not used since the value of the correlation coefficient is unknown. However, we must expect that coefficient to be positive because the population income distribution has positive skewness. (Cf. J. Splawa-Neyman, 'Contribution to the Theory of Small Samples Drawn from a Finite Population', *Biometrica,* 1925, p. 479, and 'On the Correlation of the Mean and the Variance in Samples Drawn from an 'Infinite' Population', *ibid.,* 1926, p. 412.) If $r_{\sigma\bar{x}} > 0$, σ_v computed from the less complete formula will be larger than if computed from the more complete one. Therefore, our test tends to be too rigorous and possibly leads to the rejection of truly significant differences between coefficients of variation.

As a consequence of the sampling by blocks, our tests are subject to a second bias which works in the opposite direction. The σ_v's are computed on the assumption that the v's are derived from N independent observations—the number of families in the sample. But as can be seen from Appendix A 3, the true number of independent observations must be assumed to be smaller than the number of families in the sample. Therefore, our tests tend to be too weak and possibly lead to the acceptance of insignificant differences as significant.

The critical region consists of both 2.5 per cent tails of the normal distribution.

emphatically by the coefficients of concentration which increase for all entire-city and tenant samples, and 29 owner samples (Table 7). The four cases of decreasing inequality occur in the owner samples of Lincoln, Little Rock, Portland (Maine), and Richmond. Of the 132 subsamples by type of canvass all except 6 furnish increasing coefficients of concentration.[8] The almost universal increase in the concentration coefficients is due not to increases in the mean differences between family incomes, for the latter decline everywhere (see Table 7), but to the proportionately smaller declines in mean differences than in the corresponding mean incomes (Chart 4). In this chart, where the relative declines of the two measures are plotted against each other, all points lie below the line of equal proportional change.

On the average, inequality increases among tenant incomes twice as much as among owner incomes. As we have seen, declines in coefficients of variation and concentration are less frequent among tenants than among owners. Moreover, when both groups show increases, those of tenants tend to be greater. For the 33 cities the average increase in the coefficients of variation for tenants increase 12.5 per cent, for owners 6 per cent. The average rate of increase in the coefficients of concentration is 17 per cent for tenants, 9 per cent for owners.

The *level* of income inequality is higher for owners than for tenants, not only in 1929 but also in 1933. The exceptions in Atlanta and Birmingham may be explained by the peculiar racial composition of the population. In both cities more than a third of the inhabitants are negroes. Negro families form a larger proportion of the tenant than of the owner population. The percentage of negroes among tenants is 37 per cent in Atlanta, 53 per cent in Birmingham; among owners, 15 and 28 per cent, respectively. Since the average incomes of whites and negroes differ considerably, greater inequality may be expected for the more heterogeneous tenant population.

Exceptions to the rule of increasing coefficients of *concentration* during the depression are much less numerous than exceptions to the rule of increasing coefficients of *variation*. Among the latter there were 6 exceptions in the entire-city samples, 3 among tenants, and 7 among owners. In the analysis of coefficients of concentration,

[8] The exceptions are tenants, personal enumeration, in Worcester; owners, mail returns, in Lincoln, Little Rock, Portland (Maine), Richmond, and St. Joseph (see Table 8).

TABLE 7

Coefficient of Concentration and Mean Difference, 1929 and 1933

Identical Samples: Entire-city, Tenant, Owner-occupant

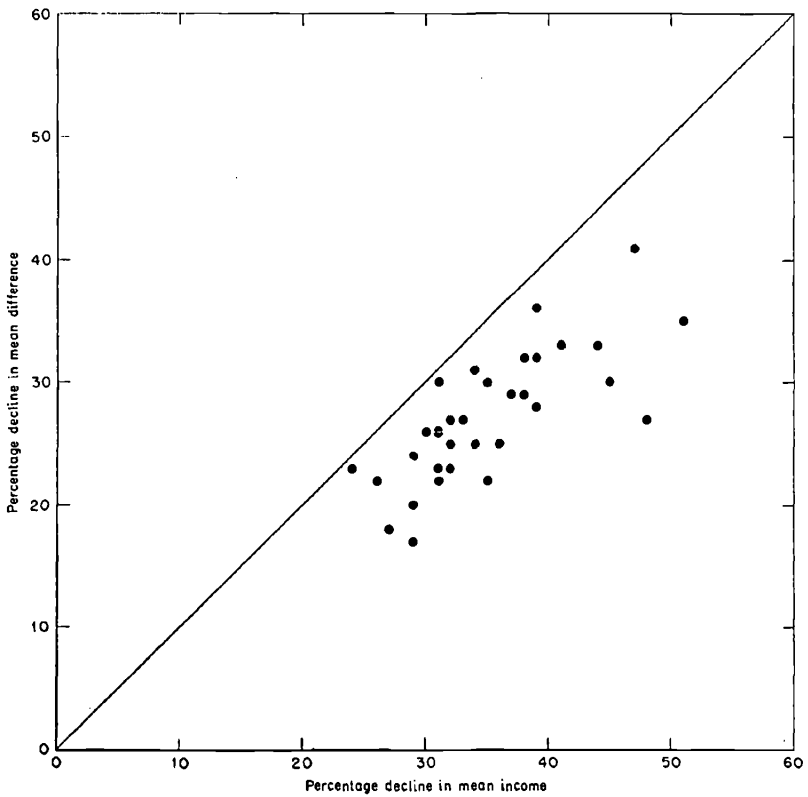
	ENTIRE-CITY				TENANT				OWNER-OCCUPANT			
	Coefficient of concentration		Mean difference (dollars)		Coefficient of concentration		Mean difference (dollars)		Coefficient of concentration		Mean difference (dollars)	
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Atlanta	.475	.509	1,690	1,248	.453	.501	1,280	968	.442	.455	2,390	1,711
Birmingham	.459	.519	1,520	904	.450	.520	1,288	779	.438	.478	1,986	1,150
Boise	.359	.405	1,206	992	.336	.383	1,062	915	.384	.436	1,392	1,106
Butte	.372	.519	1,508	1,104	.343	.508	1,291	1,023	.410	.532	1,851	1,229
Cleveland	.432	.484	1,802	1,204	.399	.451	1,477	1,035	.467	.524	2,301	1,463
Dallas	.381	.409	1,606	1,170	.338	.381	1,245	959	.422	.439	2,165	1,510
Des Moines	.382	.432	1,446	1,134	.332	.391	1,133	935	.427	.471	1,826	1,384
Erie	.396	.498	1,390	968	.364	.481	1,174	884	.428	.521	1,670	1,093
Indianapolis	.439	.475	2,016	1,412	.407	.458	1,613	1,189	.467	.487	2,707	1,802
Lansing	.352	.421	1,336	901	.321	.391	1,098	657	.373	.446	1,601	1,077
Lincoln	.425	.448	1,664	1,154	.351	.419	1,179	985	.479	.475	2,186	1,343
Little Rock	.469	.495	1,765	1,133	.422	.478	1,256	896	.487	.483	2,524	1,458
Minneapolis	.367	.407	1,463	1,102	.338	.383	1,202	939	.388	.431	1,788	1,324
Oklahoma City	.408	.447	1,678	1,147	.361	.406	1,273	890	.453	.477	2,337	1,531
Peoria	.404	.439	1,568	1,145	.351	.403	1,188	930	.441	.466	1,953	1,363
Portland, Me.	.397	.419	1,657	1,226	.332	.382	1,188	991	.468	.462	2,596	1,701
Portland, Ore.	.391	.461	1,340	970	.358	.442	1,063	803	.408	.467	1,627	1,144
Providence	.403	.449	1,539	1,184	.359	.412	1,193	939	.441	.480	2,063	1,557
Racine	.376	.496	1,345	869	.353	.500	1,167	832	.395	.496	1,532	917
Richmond	.456	.458	1,740	1,338	.428	.438	1,322	1,064	.448	.443	2,452	1,799
Sacramento	.357	.403	1,497	1,205	.322	.376	1,204	1,021	.394	.429	1,942	1,471
St. Joseph	.410	.431	1,465	1,137	.378	.403	1,195	974	.438	.461	1,847	1,370
St. Paul	.361	.423	1,273	1,058	.322	.409	966	861	.382	.422	1,574	1,247
Salt Lake City	.411	.457	1,607	1,136	.369	.436	1,255	966	.440	.467	1,998	1,320
San Diego	.384	.391	1,422	1,001	.353	.365	1,220	893	.417	.420	1,707	1,154
Seattle	.388	.429	1,508	1,023	.370	.403	1,334	901	.401	.450	1,700	1,149
Springfield, Mo.	.399	.455	1,233	954	.374	.443	1,020	819	.414	.456	1,456	1,087
Syracuse	.374	.437	1,477	1,112	.312	.394	1,038	865	.421	.470	2,061	1,444
Topeka	.403	.432	1,423	1,059	.382	.413	1,196	885	.413	.439	1,636	1,227
Trenton	.380	.451	1,201	931	.355	.454	956	811	.388	.438	1,424	1,035
Wheeling	.406	.455	1,211	904	.368	.423	1,044	802	.447	.493	1,425	1,039
Wichita	.379	.434	1,404	993	.341	.409	1,157	873	.422	.465	1,772	1,181
Worcester	.420	.451	1,724	1,313	.357	.408	1,225	1,007	.470	.480	2,619	1,863

only 4 samples, part of the last-mentioned group of 7, furnish exceptions. The reasons for a showing of increasing inequality by coefficients of concentration in 10 samples where the coefficients of variation indicate declining inequality will become apparent from the analysis of changes in sections of the income distribution (see Sec. 3c and App. C). Because of the differences in their mathematical structure, the two measures are not equally sensitive to changes in inequality within the upper income strata, and the type of change found for these strata differs from that for the distribution as a whole.

The observed increase in income inequality cannot be ascribed to any bias in the usable samples of the Financial Survey, or to bias arising when usable samples are reduced to identical samples. Appendix A 3 shows that the usable samples of 1933 incomes are likely

CHART 4

Percentage Decline in Mean Income and Mean Difference
33 Entire-city Samples



to understate and the usable 1929 samples to overstate income inequality. Hence, the sampling bias was in the direction of understating increases in income inequality; and the true increase in the latter may, therefore, be greater than that shown in Tables 6–8.

Reduction of the usable samples to identical samples did not change the coefficients of concentration noticeably. In 1929 they are the same for both samples. In 1933 the differences between them are minute: in 18 cities the coefficient for the usable sample exceeds that for the identical sample, the maximum difference being .011; in 12

TABLE 8

Coefficient of Concentration, 1929 and 1933

Identical Samples: Tenant and Owner-occupant, by Type of Canvass

	TENANT				OWNER-OCCUPANT			
	Mail returns		Personal enumeration		Mail returns		Personal enumeration	
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Atlanta	.498	.538	.413	.473	.452	.458	.432	.449
Birmingham	.434	.495	.453	.526	.449	.477	.427	.477
Boise	.316	.371	.355	.395	.369	.414	.408	.458
Butte	.346	.505	.332	.510	.416	.539	.393	.513
Cleveland	.415	.480	.378	.448	.497	.532	.421	.511
Dallas	.350	.376	.326	.379	.435	.448	.404	.421
Des Moines	.350	.400	.313	.375	.451	.489	.393	.445
Erie	.381	.484	.332	.471	.447	.532	.384	.490
Indianapolis	.393	.427	.423	.492	.466	.474	.465	.495
Lansing	.304	.396	.334	.388	.400	.468	.346	.428
Lincoln	.364	.419	.335	.422	.507	.482	.429	.463
Little Rock	.442	.504	.400	.453	.503	.497	.450	.454
Minneapolis	.355	.411	.325	.362	.405	.450	.369	.410
Oklahoma City	.377	.402	.354	.406	.463	.466	.436	.480
Peoria	.347	.392	.360	.412	.429	.472	.454	.457
Portland, Me.	.346	.384	.305	.373	.485	.477	.429	.437
Portland, Ore.	.341	.426	.362	.447	.402	.443	.413	.481
Providence	.384	.428	.342	.401	.492	.514	.402	.457
Racine	.344	.499	.362	.498	.415	.501	.362	.486
Richmond	.414	.415	.414	.433	.444	.433	.432	.436
Sacramento	.297	.359	.326	.379	.392	.424	.392	.405
St. Joseph	.357	.398	.404	.408	.452	.446	.414	.474
St. Paul	.321	.374	.315	.418	.453	.465	.339	.398
Salt Lake City	.358	.430	.376	.437	.442	.453	.428	.475
San Diego	.338	.359	.364	.373	.419	.422	.415	.416
Seattle	.377	.423	.371	.387	.416	.478	.391	.428
Springfield, Mo.	.389	.463	.353	.422	.439	.467	.374	.435
Syracuse	.305	.387	.304	.386	.463	.493	.342	.436
Topeka	.353	.387	.411	.445	.423	.456	.401	.420
Trenton	.382	.474	.337	.441	.420	.449	.362	.432
Wheeling	.378	.417	.361	.425	.472	.508	.427	.479
Wichita	.332	.399	.350	.419	.425	.468	.417	.456
Worcester	.349	.409	.392	.386	.467	.469	.469	.497

cities the opposite situation obtains, the maximum difference being .006; and in 3 cities there is no difference at all. If the coefficients of the usable samples (Table 9) are substituted for those of the identical samples (Table 7, col. 2) dispersion increased from 1929 to 1933 in all cities except Richmond, where an insignificant increase of .002 is changed into a decline of the same size. Therefore, the increase in dispersion depicted by the identical samples cannot be ascribed to the omission of the half-reporting samples. The coefficient of concentration for the total of the 33 usable samples rises from .428 in 1929 to .478 in 1933.

Since for all the entire-city samples the coefficients of concentra-

TABLE 9

Coefficient of Concentration, 1933

Identical and Usable Samples: Entire-city

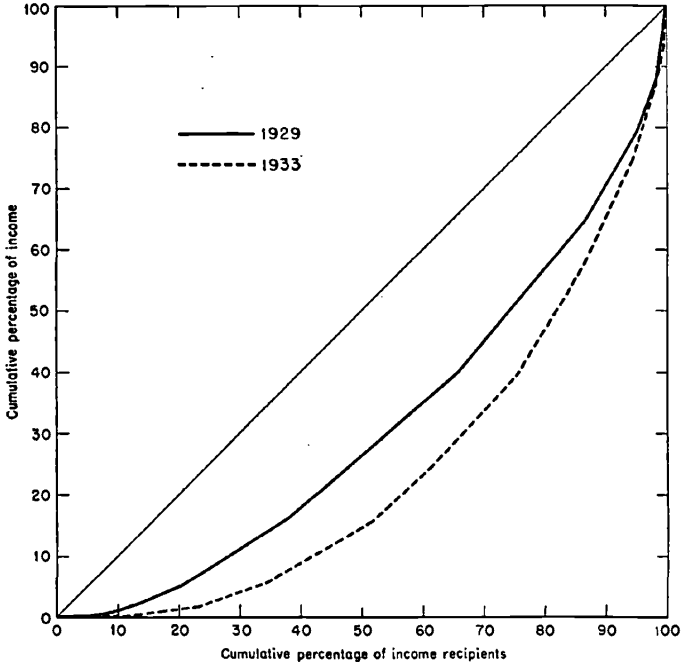
	IDENTICAL SAMPLES (1)	USABLE SAMPLES (2)
Atlanta	.509	.509
Birmingham	.519	.515
Boise	.405	.409
Butte	.519	.517
Cleveland	.484	.483
Dallas	.409	.414
Des Moines	.432	.437
Erie	.498	.501
Indianapolis	.475	.480
Lansing	.421	.421
Lincoln	.448	.455
Little Rock	.495	.498
Minneapolis	.407	.407
Oklahoma City	.447	.454
Peoria	.439	.443
Portland, Me.	.419	.418
Portland, Ore.	.461	.459
Providence	.449	.451
Racine	.496	.492
Richmond	.458	.454
Sacramento	.403	.409
St. Joseph	.431	.440
St. Paul	.423	.424
Salt Lake City	.457	.451
San Diego	.391	.390
Seattle	.429	.423
Springfield, Mo.	.455	.461
Syracuse	.437	.441
Topeka	.432	.431
Trenton	.451	.452
Wheeling	.455	.466
Wichita	.434	.440
Worcester	.451	.453

tion are larger in 1933 than in 1929, the 1933 Lorenz curves must on the whole deviate more from the line of equal distribution than the 1929 curves. As can be seen from the charts for a sample of three cities, the 1933 curve—or rather the broken line—lies below (to the right of) the 1929 curve over the greater part of the income range (Charts 5–7).

An interesting detail can be observed in these charts. In the case of San Diego the curves cross at about 80 to 90 per cent of income

CHART 5

Lorenz Curves, 1929 and 1933
Butte, Entire City

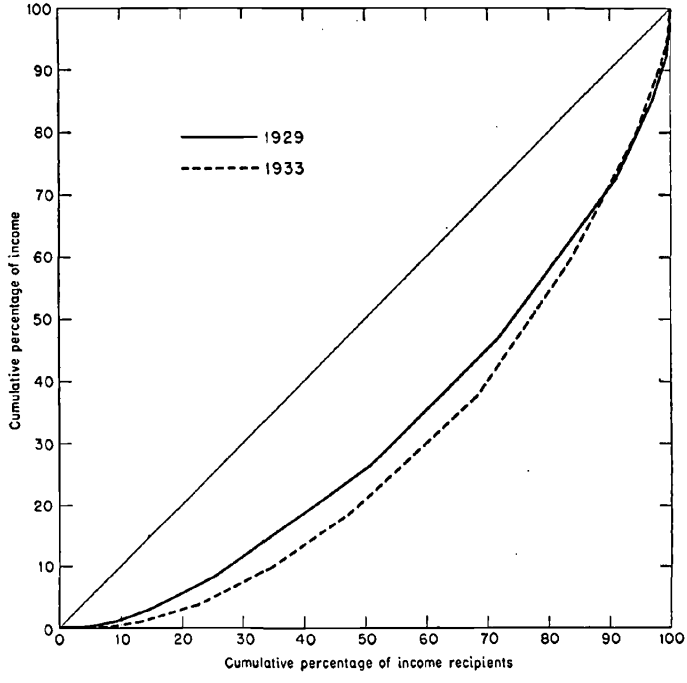


recipients. Up to some percentage near this point the 1933 curve lies to the right of the 1929 curve; from there upward the order of the two curves is reversed. Similarly, for St. Paul: the crossing point occurs between 90 and 100 per cent on the horizontal scale. In Butte the two Lorenz curves do not intersect at any point; over the entire income range the 1933 curve deviates more from the diagonal than the 1929 curve.

Though Lorenz curves for only 3 cities are depicted, they were

CHART 6

Lorenz Curves, 1929 and 1933
St. Paul, Entire City



drawn for all 33 cities and examined for intersections.[9] Among the entire-city samples, intersections of the type observed for San Diego and St. Paul appear in 21 cities. For almost all of these cases the crossing point is between 80 and 100 per cent of income recipients. In the other 12 cities, the situation is similar to that found in Butte: no intersection of the curves was detected. Among the tenant samples only 10 cities show intersection; among owners, 20 cities. Table 10 indicates the range of the income distribution within which the two curves intersect. Table 11 gives the approximate income in 1929 and 1933 at the point of intersection for the entire-city samples.[10]

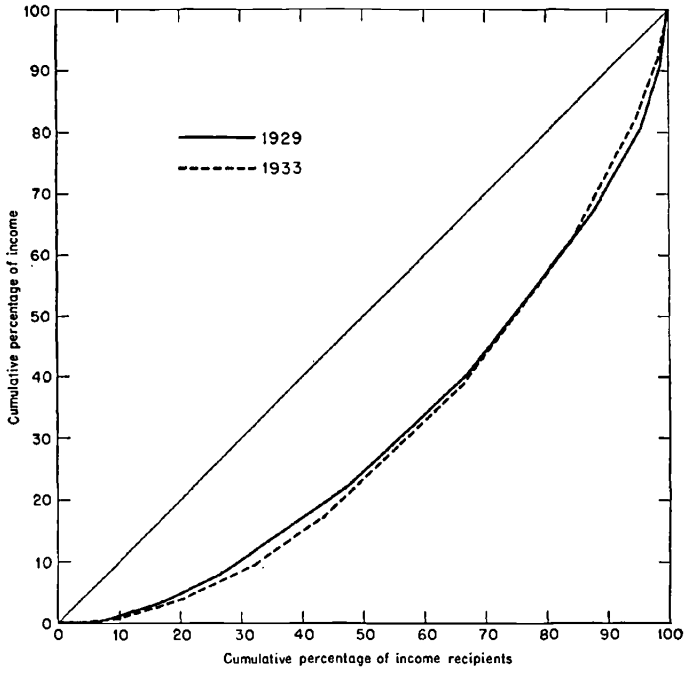
The results are similar for the usable samples. For the aggregate

[9] In judging whether Lorenz curves intersect, we do not consider the bits of straight lines linking the plotted points. We estimate instead the position of the true Lorenz curves, i.e., curves based on data for very narrow income intervals. The true curves go through the points plotted for the broader class intervals; but they lie below—to the right of—the connecting straight lines. Our judgment is based on these estimates.

[10] Since only a few points of the true Lorenz curves are known and since no interpolation between these points was carried out systematically, it is impossible to locate the points of intersection more exactly than is done in Tables 10 and 11.

CHART 7

Lorenz Curves, 1929 and 1933
San Diego, Entire City



of the 33 cities, the Lorenz curves intersect at about 95 per cent of income recipients (Chart 8). Although they do not intersect in several samples, a definite tendency to intersect is established for the entire-city and owner samples. As much cannot be said for the tenant samples, for the reason explained in the next section. For the moment, let us focus attention on the entire-city samples: What is the significance of the intersections?

A detailed picture of the income distributions in 1929 and 1933 reveals mounting inequality during the depression: the share of the highest 40, 50, or more per cent of income recipients in the aggregate income *increases* in all cities. But if we form one giant group of all incomes up to some amount that lies above the point of intersection, and another group of all higher incomes, then measure the proportion of income received by each, we find an opposite change in 21 cities. During the Great Depression, the share of the top incomes (held by the highest .1 to 20 per cent of income recipients in most cases) in aggregate income *declines* in those cities.

TABLE 10

Intersection of Lorenz Curves

Identical Samples: Entire-city, Tenant, Owner-occupant

	% OF INCOME RECIPIENTS BELOW INCOME POINT WHERE LORENZ CURVES CROSS		
	Entire-city (1)	Tenant (2)	Owner-occupant (3)
Atlanta	...	...	...
Birmingham	90–100	90–100	80– 90
Boise	...	...	...
Butte	...	...	...
Cleveland	...	90–100	...
Dallas	90–100	90–100	90–100
Des Moines	...	...	...
Erie	...	...	...
Indianapolis	...	...	70– 80
Lansing	...	...	...
Lincoln	80– 90	...	70– 80
Little Rock	80– 90	...	60– 70
Minneapolis	90–100	90–100	...
Oklahoma City	90–100	90–100	90–100
Peoria	90–100	...	90–100
Portland, Me.	80– 90	90–100	50– 60
Portland, Ore.	90–100	...	...
Providence	90–100	90–100	...
Racine	...	...	...
Richmond	70– 80	...	60– 70
Sacramento	90–100	...	80– 90
St. Joseph	80– 90	...	80– 90
St. Paul	90–100	...	90–100
Salt Lake City	90–100	...	80– 90
San Diego	80– 90	80– 90	70– 80
Seattle	90–100	80– 90	90–100
Springfield, Mo.	90–100	...	90–100
Syracuse	...	...	...
Topeka	90–100	90–100	90–100
Trenton	90–100	...	90–100
Wheeling	...	...	...
Wichita	...	...	90–100
Worcester	90–100	...	90–100

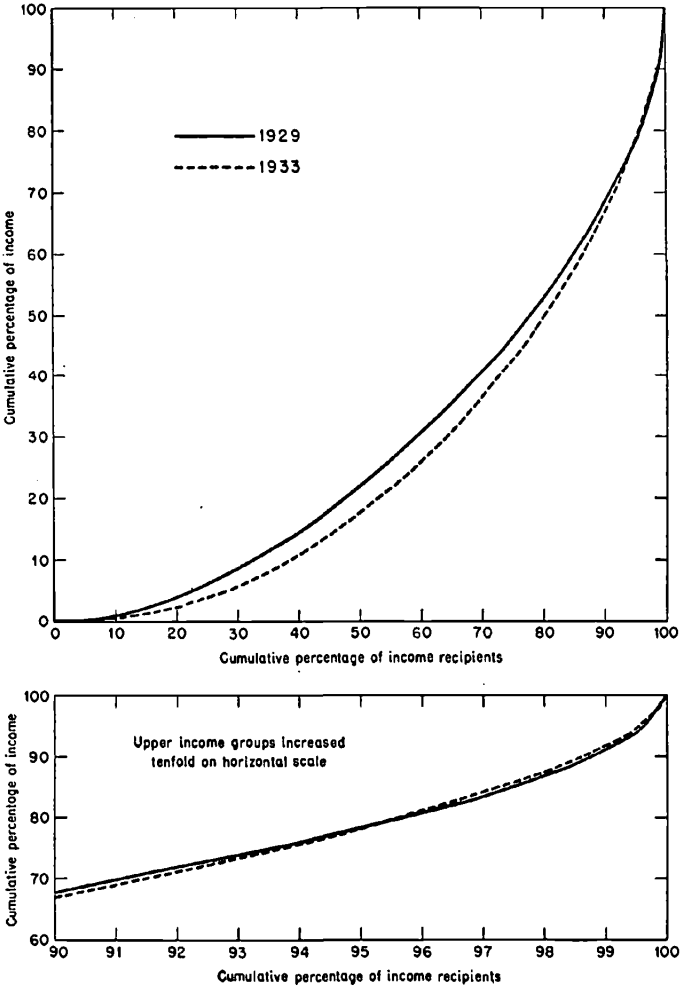
b OTHER DATA

Do income data from other sources give a similar picture of changes in inequality during fluctuations in business activity? For reasons that will become apparent in the next section we cannot rely on information confined to either the lower or the upper strata of the income pyramid. We must look for data that resemble those of the Financial Survey in coverage of income.

There is a scarcity of suitable material. The tabulations of federal income tax returns do not cover the low income groups because,

CHART 8

Lorenz Curves, 1929 and 1933
33 Entire-city Samples Combined



until very recently, tax-exempt income lay above the mode of the income distribution. Many income recipients were not subject to the income tax, particularly in depressions. Somewhat more satisfactory information is available from tabulations of Delaware and Wisconsin state income tax returns.[11] Every resident of Delaware, 21 years or older, must file a return. In Wisconsin individuals with net incomes above $800 and married persons with net incomes

[11] Negative incomes were omitted from these distributions to make them comparable—in this respect at least—with the Financial Survey and with other auxiliary data.

TABLE 11

Income at Intersection of Lorenz Curves

Identical Samples: Entire-city

	INCOME RANGE COVERING POINT OF INTERSECTION	
	1929	*1933*
Birmingham	$3,000–4,500	$2,000–3,000
Dallas	3,000–4,500	2,000–3,000
Lincoln	3,000–4,500	2,000–3,000
Little Rock	3,000–4,500	2,000–3,000
Minneapolis	4,500–7,500	3,000–4,500
Oklahoma City	4,500–7,500	3,000–4,500
Peoria	4,500–7,500	3,000–4,500
Portland, Me.	about 3,000	2,000–3,000
Portland, Ore.	4,500–7,500	3,000–4,500
Providence	4,500–7,500	3,000–4,500
Richmond	2,000–3,000	2,000–3,000
Sacramento	about 4,500	3,000–4,500
St. Joseph	2,000–3,000	2,000–3,000
St. Paul	about 4,500	3,000–4,500
Salt Lake City	4,500–7,500	3,000–4,500
San Diego	2,000–3,000	2,000–3,000
Seattle	4,500–7,500	3,000–4,500
Springfield, Mo.	about 4,500	3,000–4,500
Topeka	3,000–4,500	2,000–3,000
Trenton	3,000–4,500	2,000–3,000
Worcester	3,000–4,500	2,000–3,000

above $1,600 have to file returns, as do persons with lower incomes if requested by the tax assessors.[12] Under the Wisconsin system the excluded group is considerably smaller than it was—until 1940—under the federal system. Finally, data for Germany based on income and wage tax returns furnish income distributions that are virtually complete.[13]

In part, the results support the conclusion reached from the study of the Financial Survey: in the income distribution as a whole, ris-

[12] Tax assessors have assembled mailing lists of persons to whom forms are sent annually. These forms are filled in and returned by prospective taxpayers and even by many people who have no taxable income at the time. "The existence of these mailing lists has operated to obtain returns annually from a large number of persons, who, if income were the sole criterion, would file only sporadically." (F. A. Hanna, *A Critical Analysis of Wisconsin Individual Income Tax Statistics;* Wisconsin Tax Commission, 1939.)

[13] Appendix A 1 supplies further information on the nature and sources of these data. The concepts of income underlying the various compilations differ. In Delaware the aggregate income of persons (or married couples), after deduction of expenses incurred in earning salaries, wages, etc. only, are classified by their amount. In Wisconsin *all* authorized deductions are made beforehand, yielding *net* taxable incomes, which are classified by their amount. For Germany the figures represent aggregate personal income.

ing inequality accompanies falling mean income. Comparisons of the figures for Wisconsin 1929 and 1934, Germany 1928 (or 1926) and 1932 (or 1934) show the tendency observed in the Financial Survey (Table 12). But several cases do not conform: the Wisconsin comparison for 1929 and 1936 is inconclusive, those of Wisconsin for 1929 and 1935 and of Delaware for 1937 and 1938 definitely do not agree.

Comparisons for Delaware (1936 to 1937) and Wisconsin (1934 to 1935 or 1936) indicate that income inequality diminishes with a cyclical rise in mean income, as do also those for Germany 1932 (or 1934) to 1936; but the German material does not conform 1926 to 1928 (or 1936), or the Wisconsin material, 1935–36. Looking at changes between adjacent years only,[14] we find inverse correlation between inequality and mean income in 6 out of 9 comparisons (one of which is rather inconclusive) and positive correlation in 3.

Considering these results in conjunction with those from the

[14] I.e., comparing pairs of consecutive years for Delaware, and Wisconsin from 1934 on, and pairs of adjacent years in Table 12 for the other cases. No comparable data are available for Wisconsin 1930–33, and Germany 1927, 1929–31, 1932 and 1935.

TABLE 12

Income Level and Inequality

Nonidentical Samples: Delaware, Wisconsin, Germany

INCOME CONCEPT		MEAN INCOME (1)	COEFFICIENT OF CONCENTRATION (2)	NO. OF INCOME GROUPS DISTINGUISHED (3)
		Delaware, state income tax data		
		(dollars)		
Total income by total income groups	1936	1,832	.686	35
	1937	1,906	.650	35
	1938	1,699	.616	35
		Wisconsin, state income tax data		
Net taxable income by net taxable income groups	1929	2,024	.375	37
	1934	1,286	.382	37
	1935	1,417	.364	37
	1936	1,584	.374	37
		Germany, income and wage tax data		
		(Reichsmarks)		
Total income by total income groups	1926	1,486	.380	10
	1928	1,723	.386	10
	1932	1,168	.443	10
	1934	1,321	.442	10
	1936	1,735	.416	10

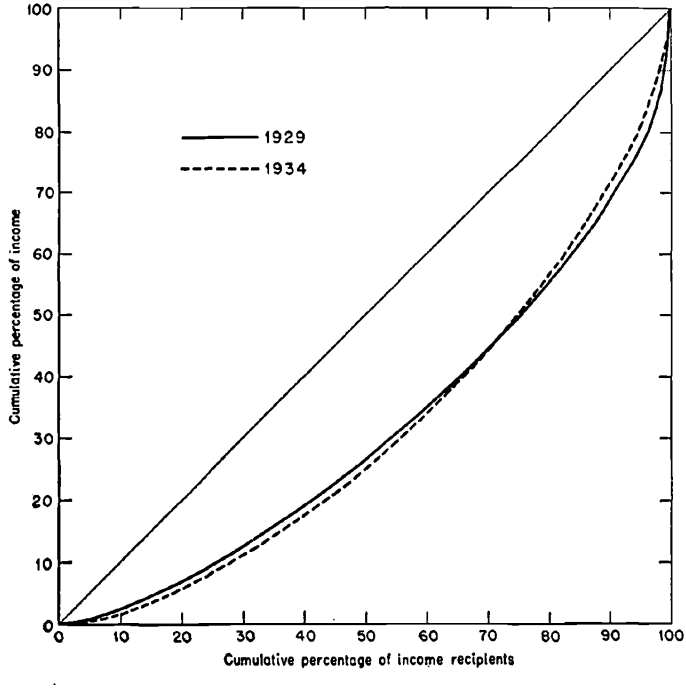
Financial Survey, we may say that inequality in the distribution of personal incomes by size tends to increase with the fall of the income level during depression. The evidence is rather weak for a decline in inequality when the income level is rising; but it seems strong enough to keep us from rejecting that hypothesis for the moment.

While during the Great Depression the level of income and the degree of inequality in its distribution tended to vary in opposite directions, our analysis of the Financial Survey has shown, that in most cities the share of the top incomes in aggregate income tended to move in the *same* direction as the level of income. The data for Wisconsin and Germany lend further support to this thesis, as is indicated by the crossing of the Lorenz curves for Wisconsin, 1929 and 1934, and Germany, 1928 and 1932, 1932 and 1936 [15] (Charts 9–12). The charts show that the depression-year curve cuts the pros-

[15] No significance is attached to the crossing of the curves for Germany in 1932 and 1936 within the region of the lower income groups. It is probably due to the absence of more detailed data for these groups.

CHART 9

Lorenz Curves, 1929 and 1934
Wisconsin



perity-year curve from right to left at a point above which lie about 38 per cent of those who file tax returns in Wisconsin and about 5 per cent of German income recipients. For Delaware the Lorenz curves do not cross. Over the entire income scale, the curve for 1938 lies inside that for 1937.

A. J. Goldenthal studied the shares of the total individual income held by the highest 1, 2, or fractions of 1, per cent of the nation's income recipients in prosperity and depression.[16] His basic material consisted of national income aggregates and federal income tax data which did not lend themselves to a breakdown of the mass of lower incomes into several groups. His findings, that the share of the top incomes—and in this sense, the degree of income concentration—was high in prosperity, low in depression, agree with the results obtained for 21 cities covered by the Financial Survey; but it would be incorrect to conclude that, whatever the lower limit of the group

[16] *Concentration and Composition of Individual Incomes, 1918–1937,* Temporary National Economic Committee, Monograph 4 (Washington, D. C., 1940).

CHART 10

Lorenz Curves, 1937 and 1938
Delaware

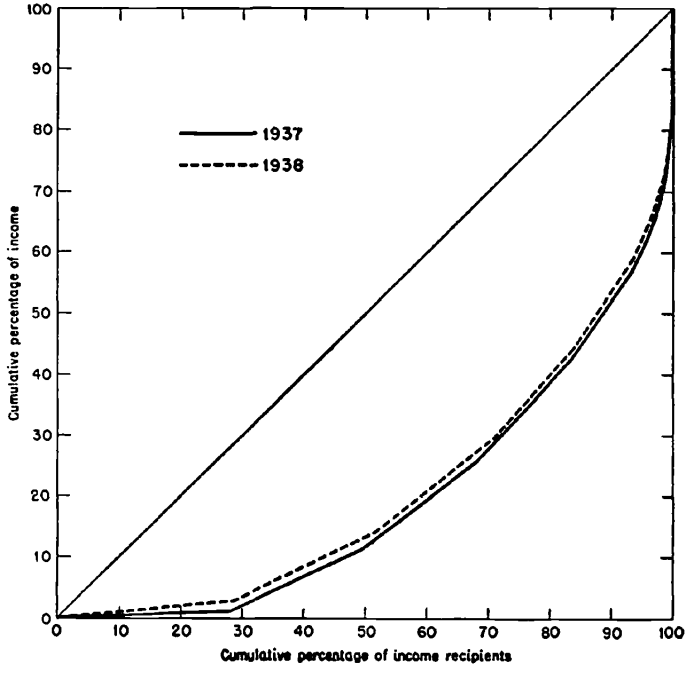
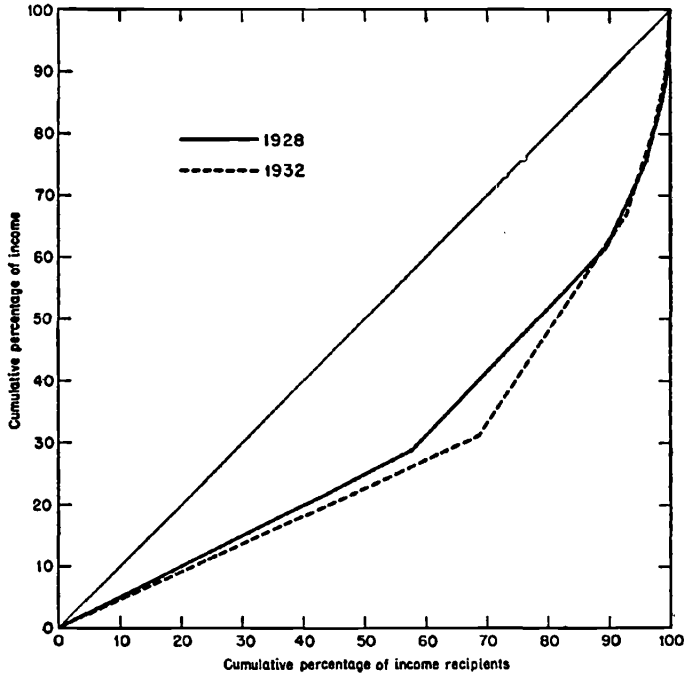


CHART 11

Lorenz Curves, 1928 and 1932
Germany



of top incomes, the share of that group in aggregate income declined during the depression. It would be more correct to say that the share of the top incomes declines during business contractions but that the share of a broader group of high incomes—including the upper 30 or more per cent of income recipients—tends to increase.

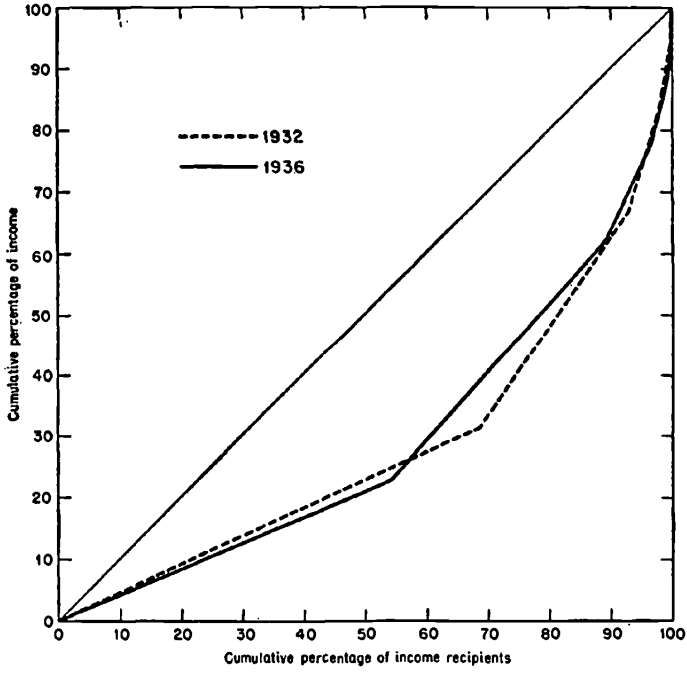
3 Changes in Sections of the Income Distributions

Previous studies of the distribution of net incomes undertaken on the basis of federal income tax statistics have led to the conclusion that *the degree of inequality among net incomes in excess of $5,000* is *positively* correlated with the level of general business activity. From an examination of Pareto curves W. L. Crum and N. O. Johnson found income inequality within this group to be greater in prosperity than in depression.[17] The behavior of the relative difference between median and equatorial incomes confirms this rela-

[17] 'Individual Shares in the National Income', *Review of Economic Statistics*, Nov. 1935; 'The Pareto Law', *ibid.*, Feb. 1937.

CHART 12

Lorenz Curves, 1932 and 1936
Germany



tion.[18] Earlier, C. Bresciani-Turroni and others were led to similar conclusions by investigations of foreign data covering the higher income groups.[19] The results shown in the preceding section cast doubt on any generalization of these findings for income distribution as a whole.[20] Nevertheless, the observations of these authors are perfectly consistent with federal income tax data, which cover the

[18] R. S. Tucker, 'The Distribution of Income Among Income Tax Payers in the United States, 1863–1935', *Quarterly Journal of Economics*, Aug. 1938. Cf. Horst Mendershausen, 'On the Measurement of the Degree of Inequality of Income Distribution', *Report of the Fifth Annual Research Conference of the Cowles Commission for Research in Economics* (University of Chicago, 1939), p. 63.

[19] Cf. 'Annual Survey of Statistical Data: Pareto's Law and the Index of Inequality of Incomes', *Econometrica*, April 1939, p. 118.

[20] In his concluding section Mr. Tucker freely generalizes his findings. Speaking of changes in the "concentration of income in the United States" he says "Concentration of income tends to increase in the upward phase of the business cycle and to decrease in the downward phase . . ." (p. 586). While this statement could be defended if income concentration were defined as the share of the *very high* incomes in total income (see above, Sec. 2) it is incorrect in view of the definitions used in Mr. Tucker's article.

right tail of the distribution of incomes 1919–33,[21] or similar foreign data. Are they consistent with our own data for the upper income strata, and if so, why does income inequality within the entire distribution and within the upper strata change in opposite directions during the same phase of the business cycle?

To answer these questions we divided each income distribution at a point that would throw below it the incomes that even in a prosperity year like 1929 were not subject to the federal income tax. An income of $2,000 in 1929 seemed a good dividing point; it was convenient also because it represents the border line between two income groups specified in the Financial Survey. We called the income recipients lying below the point of division, the lower income group (l group), those lying above, the upper (u group). While this dividing point is well below the $5,000 level of net income used in previously mentioned analyses of federal income tax data, there are strong indications that a higher dividing point would not invalidate the results obtained by the present method (see below, p. 61).

a FINANCIAL SURVEY

The percentage of families in each sample with less than $2,000 in 1929 ($\frac{N_1}{N}$ 100) was established.[22] For most of the entire-city samples it is near 67 per cent; between 62 and 72 per cent in 27 cities (see Table 13, col. 13). These percentages were then used in dividing the corresponding 1933 income distribution.[23] In this way we obtained for the two years the same ratio of the number below the dividing point (lower income group, l) to the number above (upper income group, u). Of course, this is not tantamount to keeping the same families in the same group. As will be seen in the next chapter, some families shifted from the lower to the upper group, and conversely, during the interval.

This procedure gives two sets of income distributions, one for the lower incomes and another for the higher. The following measures were used in the analysis of the sectional distributions: the coefficients of concentration for the lower group (R'_l) and the upper

[21] Examination of federal income tax distributions for later years (1934–41) casts doubt on the persistence of this relation. I am indebted to George J. Stigler for drawing my attention to this fact.

[22] N_1 is the number in the lower income group, N the number of all families in the sample.

[23] The 1933 income corresponding to that percentage was obtained by interpolation. In the various samples it is between $1,000 and $2,000, usually near $1,500.

group (R'_u), the relative difference between the mean incomes of the two groups $\frac{(\bar{x}_u - \bar{x}_l)}{\bar{x}}$, and the percentage shares of the three components of inequality, viz., inequality within the lower group (i_l), within the upper group (i_u), and between the two (i_{lu}), in the coefficients of concentration for the entire distributions (R'). For a fuller explanation and the formulae of these measures, see Appendix C, Section 2.

The measures obtained for the 33 entire-city samples tell a fairly consistent story: in 24 cities, inequality in the distributions among those with larger incomes declines from 1929 to 1933 (Table 13).[24] Though not always spectacular, the decline is clearly indicated in most cases. For the average of the 33 cities it amounts to 4 per cent. Simultaneously, inequality in the distributions among those with smaller incomes increase: the R'_l for 1933 invariably exceeds that for 1929. The average rate of increase is 22 per cent. Furthermore, the relative differences between average incomes of the lower and upper groups increase without a single exception and at an average rate of 15 per cent.[25]

The increase in the relative income spread between the two—numerically constant—groups, lower and upper, implies a reallocation of the total income in each city to the advantage of the upper group.[26] The percentage of total income held by the lower group

[24] Increases occur in 9 cities. In 3 cities the coefficients for 1929 and 1933 are the same in the first three digits as in Table 12; but if computations are carried to four digits, two (Des Moines and Springfield) appear as decreases, one (Portland, Oregon) as an increase. They were counted as such.

[25] In all samples the mean differences for the lower and upper groups as well as the absolute difference between the mean incomes of the two decline; see Table 14.

[26] By Definition:

1) share of the lower group in total income $s_l = \frac{N_l \bar{x}_l}{N \bar{x}}$

2) share of the upper group in total income $s_u = \frac{N_u \bar{x}_u}{N \bar{x}}$

3) $s_l + s_u = 1$

4) relative difference between the mean incomes of the lower and upper groups

$$\frac{\bar{x}_u - \bar{x}_l}{\bar{x}} = \frac{\bar{x}_u}{\bar{x}} - \frac{\bar{x}_l}{\bar{x}}$$

Within each sample the numbers N_l, N_u, and N are the same for 1929 and 1933. Therefore, changes in the values of the various ratios can occur only when some of the mean incomes change. Suppose that (4) increases. Since the first item on the right side always exceeds the second item, an increase in (4) implies an increase in the first in comparison with the second item. Therefore, s_u must increase in comparison with s_l, and because of (3), this means an increase in s_u, a decline in s_l.

TABLE 13

Components of Income Inequality

Identical Samples: Entire-city: Division at $2,000 in 1929

	COEFFICIENT OF CONCENTRATION				REL. DIFF. BETWEEN MEAN INCOMES OF		SHARE OF TOTAL INEQUALITY						
	l group		*u* group		*l* & *u* GROUPS		*l* group		*u* group		*l* & *u* groups		% IN *l* GROUP
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Atlanta	.335	.363	.255	.252	1.604	1.763	16.6	15.1	10.9	10.6	72.4	74.1	68.8
Birmingham	.339	.398	.243	.219	1.580	1.894	20.9	18.5	9.2	7.9	69.9	73.7	71.8
Boise	.282	.323	.159	.174	1.142	1.321	23.4	21.4	7.8	8.1	68.8	70.4	68.3
Butte	.237	.407	.260	.268	1.142	1.679	16.7	14.5	14.2	12.7	69.1	72.8	65.8
Cleveland	.296	.348	.277	.267	1.301	1.522	13.8	12.1	16.1	15.0	70.0	73.0	62.5
Dallas	.241	.286	.237	.229	1.127	1.223	13.1	13.4	16.0	14.9	70.9	71.6	60.9
Des Moines	.253	.318	.229	.229	1.204	1.371	17.0	17.4	12.3	11.6	70.7	71.1	66.1
Erie	.296	.411	.216	.233	1.279	1.683	21.7	18.9	9.8	9.6	68.5	71.5	69.2
Indianapolis	.288	.352	.280	.262	1.257	1.408	9.8	9.4	20.2	18.4	70.0	72.2	56.9
Lansing	.251	.309	.203	.238	1.057	1.287	17.3	14.9	13.0	14.2	69.7	71.0	62.9
Lincoln	.274	.328	.274	.237	1.335	1.450	15.6	16.4	13.9	11.8	70.5	71.8	66.2
Little Rock	.347	.398	.265	.231	1.496	1.625	16.2	15.9	12.8	11.1	71.1	73.0	66.3
Minneapolis	.225	.279	.236	.224	1.134	1.284	15.3	15.4	13.9	12.5	70.8	72.1	64.6
Oklahoma City	.280	.328	.251	.237	1.232	1.387	14.4	13.6	15.3	13.8	70.3	72.5	62.4
Peoria	.264	.313	.259	.247	1.282	1.417	17.1	17.0	12.9	11.8	70.0	71.1	67.0
Portland, Me.	.230	.273	.275	.223	1.218	1.349	13.7	14.0	15.7	12.6	70.6	73.4	64.3
Portland, Ore.	.290	.371	.211	.211	1.281	1.562	22.8	21.4	9.0	8.4	68.3	70.2	70.4
Providence	.250	.307	.272	.266	1.317	1.487	17.1	17.3	12.7	11.8	70.2	71.0	68.7
Racine	.293	.427	.213	.218	1.159	1.637	22.0	18.3	10.6	9.8	67.5	71.9	67.4
Richmond	.308	.318	.263	.235	1.488	1.514	15.4	15.5	12.5	11.4	72.1	73.1	66.9
Sacramento	.239	.301	.218	.210	1.032	1.185	12.5	12.7	17.3	15.6	70.2	71.7	58.0
St. Joseph	.274	.321	.256	.238	1.384	1.449	20.0	21.8	10.5	9.3	69.5	69.0	71.1
St. Paul	.238	.328	.230	.202	1.221	1.450	22.2	23.7	9.4	7.7	68.4	68.6	71.9
Salt Lake City	.280	.345	.254	.224	1.273	1.470	16.3	15.8	13.6	11.6	70.1	72.6	65.3
San Diego	.262	.295	.228	.191	1.213	1.249	18.6	20.2	11.5	9.7	69.9	70.2	67.3
Seattle	.274	.306	.225	.205	1.172	1.359	16.2	14.2	13.7	12.1	70.1	73.7	63.2
Springfield, Mo.	.300	.362	.203	.203	1.428	1.659	28.2	27.4	6.2	5.9	65.5	66.7	75.8
Syracuse	.249	.303	.233	.242	1.122	1.361	15.5	13.4	14.7	14.1	69.9	72.4	63.0
Topeka	.288	.322	.228	.217	1.314	1.440	20.6	20.1	10.2	9.3	69.2	70.6	69.4
Trenton	.269	.366	.199	.183	1.342	1.621	25.9	26.5	6.9	5.7	67.3	67.8	74.6
Wheeling	.330	.370	.186	.203	1.414	1.640	30.6	28.4	5.6	5.7	63.7	65.9	75.9
Wichita	.254	.321	.219	.222	1.219	1.424	18.5	18.3	11.1	10.3	70.4	71.3	67.6
Worcester	.273	.315	.286	.274	1.265	1.379	14.6	14.5	16.0	14.9	69.5	70.6	64.2

TABLE 14

Mean Differences within Sections of the Distribution

Identical Samples: Entire-city

	MEAN DIFFERENCES WITHIN THE *l* GROUP		MEAN INCOME OF THE *l* GROUP		MEAN DIFFERENCES WITHIN THE *u* GROUP		MEAN INCOME OF THE *u* GROUP	
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				(dollars)				
Alanta	595	400	888	551	1,907	1,364	3,740	2,707
Birmingham	620	322	915	405	1,716	898	3,530	2,051
Boise	606	458	1,074	709	952	808	2,993	2,322
Butte	584	367	1,233	451	1,844	1,197	3,547	2,234
Cleveland	635	371	1,072	533	2,097	1,290	3,785	2,415
Dallas	561	421	1,164	736	1,677	1,136	3,538	2,481
Des Moines	567	448	1,121	705	1,558	1,147	3,401	2,505
Erie	630	383	1,065	466	1,430	977	3,311	2,097
Indianapolis	606	409	1,052	581	2,205	1,398	3,937	2,667
Lansing	582	344	1,160	557	1,281	919	3,156	1,931
Lincoln	588	431	1,073	657	2,020	1,194	3,686	2,520
Little Rock	647	410	935	515	1,988	1,094	3,751	2,367
Minneapolis	536	411	1,192	736	1,630	1,106	3,453	2,469
Oklahoma City	619	401	1,105	611	1,826	1,127	3,638	2,378
Peoria	592	434	1,122	693	1,870	1,253	3,610	2,537
Portland, Me.	543	414	1,180	758	2,047	1,217	3,721	2,728
Portland, Ore.	617	418	1,063	564	1,375	928	3,258	2,199
Providence	562	432	1,123	703	1,980	1,415	3,639	2,659
Racine	652	349	1,113	409	1,357	802	3,186	1,840
Richmond	597	464	969	729	2,004	1,380	3,809	2,937
Sacramento	567	452	1,186	750	1,461	1,059	3,350	2,521
St. Joseph	585	490	1,068	763	1,812	1,269	3,539	2,665
St. Paul	550	485	1,155	740	1,522	1,030	3,308	2,549
Salt Lake City	612	421	1,092	610	1,819	1,083	3,580	2,418
San Diego	585	446	1,117	756	1,534	898	3,363	2,351
Seattle	608	362	1,109	592	1,524	902	3,387	2,201
Springfield, Mo.	607	455	1,012	628	1,307	961	3,218	2,367
Syracuse	575	380	1,154	627	1,570	1,138	3,369	2,352
Topeka	609	442	1,058	687	1,541	1,064	3,379	2,452
Trenton	559	444	1,039	606	1,258	833	3,160	2,276
Wheeling	647	443	981	599	1,149	903	3,089	2,224
Wichita	569	395	1,121	615	1,480	993	3,378	2,237
Worcester	613	463	1,122	735	2,127	1,503	3,719	2,743

declines in all cities (Table 15). The average for 33 cities shows that the share of the lower income recipients—in most cities about two-thirds of the families—declines 11 per cent.

Thus the upper income strata in the Financial Survey material tend to show the same sort of variations in income dispersion as other data for higher income groups. Inequality among the incomes

TABLE 15

Percentages of Total Income Held by the Lower Group
Identical Samples: Entire-city, Tenant, and Owner-occupant

	ENTIRE-CITY		TENANT		OWNER-OCCUPANT	
	1929	*1933*	*1929*	*1933*	*1929*	*1933*
	(1)	(2)	(3)	(4)	(5)	(6)
Atlanta	34.4	31.0	46.2	27.5	18.6	17.5
Birmingham	39.6	33.5	48.2	41.1	24.9	20.5
Boise	43.7	39.6	49.3	45.2	37.7	33.3
Butte	40.0	27.9	45.8	31.5	32.1	22.0
Cleveland	32.2	27.0	39.2	34.0	23.8	19.5
Dallas	33.9	31.7	42.9	39.5	21.7	19.6
Des Moines	39.2	35.6	47.4	43.2	30.8	27.1
Erie	42.0	33.3	49.6	39.5	33.6	25.5
Indianapolis	26.1	22.3	33.1	28.9	16.9	14.4
Lansing	38.5	32.7	47.0	41.9	30.3	24.8
Lincoln	36.3	33.9	46.5	41.7	27.4	26.1
Little Rock	32.9	29.9	46.0	41.8	19.2	17.6
Minneapolis	38.6	35.2	47.2	44.2	28.9	25.2
Oklahoma City	33.5	30.0	43.6	40.0	21.4	18.9
Peoria	38.8	35.7	49.1	45.4	29.9	27.2
Portland, Me.	36.4	34.4	46.7	43.4	20.9	20.2
Portland, Ore.	43.6	38.0	54.2	47.5	33.9	28.4
Providence	40.4	36.7	51.0	47.3	27.6	24.3
Racine	41.9	31.5	49.1	36.7	35.1	25.8
Richmond	34.0	33.5	45.4	44.1	19.3	16.9
Sacramento	32.7	29.0	39.9	35.3	24.0	20.6
St. Joseph	42.4	41.3	50.8	49.8	32.6	30.1
St. Paul	47.0	42.7	59.5	53.7	36.7	33.3
Salt Lake City	36.5	32.1	46.4	40.6	27.1	23.1
San Diego	40.6	39.8	46.8	45.8	32.4	31.5
Seattle	36.2	31.5	41.8	38.8	30.2	25.7
Springfield, Mo.	49.7	45.5	58.2	53.8	42.0	38.4
Syracuse	36.8	31.1	48.2	41.0	24.8	21.3
Topeka	41.6	38.9	50.2	47.5	34.2	30.5
Trenton	49.0	43.9	60.0	54.0	40.1	36.2
Wheeling	49.9	45.9	57.1	52.8	41.5	36.6
Wichita	40.9	36.6	47.0	41.4	33.3	29.4
Worcester	35.1	32.3	46.6	42.8	19.5	18.1

of the upper group decreases during the depression.[27] The opposite relation between income level and inequality for the distribution as a whole must be explained by the increase in inequality within the lower group and in the difference in mean income between the lower and upper groups during business contractions.

The share of inequality within the upper income group in the

[27] Since it was found that bias in the material might cause a decline in income dispersion for the entire distribution, we tested whether the bias might explain the observed decline in inequality within the upper group. The test indicated that this possibility cannot be ruled out altogether, but does not furnish conclusive evidence that the decline is attributable to bias; see App. A, Sec. 3.

degree of inequality in the entire distribution (i_u) decreases in most (30) cities, while that of the relative difference in mean income between the lower and upper groups (i_{lu}) increases in 32 cities from 1929 to 1933. The share of inequality within the lower group (i_l) does not show as clear-cut a tendency: it increases in 12 cities and decreases in the other 21. Of the three components of inequality, the relative difference in mean income between the two groups gains a more prominent place during the depression, while inequality within the lower and upper groups loses in relative importance.

As will be observed, even in 1929 the relative difference in mean income between the lower and upper groups is by far the most important component of total dispersion, accounting for about 70 per cent of it in terms of the coefficient of concentration. Therefore changes in this element of inequality are likely to produce similar changes in total dispersion. The generally observed increase of the latter during the depression, noted in the preceding section, must be ascribed primarily to the increasing relative difference in mean income between the lower and upper groups.

The same sort of analysis was carried out for tenants and owners separately (Tables 16 and 17). Splitting the owner distributions at $2,000 in 1929 yields smaller percentages of lower income recipients than splitting the entire-city distributions at the same amount, and conversely for tenants. In the owner sample the percentages of the lower group range from 47 to 72, among tenants from 62 to 81.

The tenant samples show increasing inequality within the lower group and increasing relative difference in mean income between the lower and upper groups, except in Richmond; but in only 13 out of 33 cities do they show decreasing inequality within the upper group. In 20 tenant samples inequality within the upper group increases. The share of inequality within the lower group in total inequality tends to decrease (24 samples), as does the share of inequality within the upper group (20 samples). The share of inequality attributable to relative differences in mean income between the lower and upper groups increases in 27 samples.

For owners inequality in the distribution of income increases consistently within the lower group (32 samples); and so does the relative difference in mean income between the lower and upper groups (33 samples). Within the upper group, the situation differs from that found for tenants and resembles that of the entire cities: income inequality declines in 22 samples, increases in 11. The

TABLE 16

Components of Income Inequality

Identical Samples: Tenant; Division at $2,000 in 1929

	COEFFICIENT OF CONCENTRATION				REL. DIFF. BETWEEN MEAN INCOMES OF		SHARE OF TOTAL INEQUALITY						
	l group		*u* group		*l* & *u* GROUPS		*l* group		*u* group		*l* & *u* groups		% IN *l* GROUP
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Atlanta	.336	.380	.195	.206	1.751	2.001	26.5	24.9	5.3	5.4	68.2	69.7	77.1
Birmingham	.342	.400	.220	.202	1.714	2.124	28.5	24.6	5.6	5.0	65.9	70.4	77.8
Boise	.272	.302	.115	.141	1.089	1.299	28.7	25.5	5.1	5.7	66.3	68.8	71.6
Butte	.227	.402	.221	.213	1.096	1.775	21.0	17.2	10.8	8.8	68.2	74.0	69.3
Cleveland	.287	.342	.225	.216	1.225	1.490	20.1	17.1	11.3	10.3	68.6	72.5	66.9
Dallas	.222	.274	.178	.176	1.086	1.226	18.9	19.0	10.1	9.2	71.0	71.8	67.0
Des Moines	.234	.305	.156	.165	1.106	1.295	23.5	23.5	7.2	7.2	69.3	69.3	70.3
Erie	.281	.398	.176	.183	1.221	1.734	28.0	25.8	6.6	6.0	65.4	70.2	73.3
Indianapolis	.281	.350	.227	.228	1.240	1.422	14.3	13.8	14.0	13.3	71.7	72.9	62.3
Lansing	.232	.292	.158	.210	1.028	1.262	23.4	21.4	8.1	9.7	68.5	68.9	69.0
Lincoln	.251	.324	.169	.191	1.179	1.423	23.5	22.8	7.4	7.6	69.1	69.6	71.0
Little Rock	.344	.409	.158	.181	1.482	1.704	27.9	26.5	5.2	5.6	66.9	67.8	74.3
Minneapolis	.219	.280	.199	.183	1.138	1.285	21.5	22.9	9.2	7.8	69.3	69.3	70.9
Oklahoma City	.265	.330	.178	.170	1.162	1.330	21.9	22.2	8.9	7.8	69.3	69.9	68.6
Peoria	.244	.295	.185	.197	1.204	1.390	24.9	24.2	7.1	7.2	68.0	68.6	72.9
Portland, Me.	.215	.294	.188	.181	1.091	1.245	21.2	23.2	9.1	8.1	69.7	68.7	69.7
Portland, Ore.	.282	.361	.148	.163	1.261	1.644	32.7	29.7	4.5	4.5	62.8	65.8	76.7
Providence	.236	.305	.223	.204	1.289	1.482	25.1	26.2	7.5	6.5	67.3	67.3	75.2
Racine	.283	.446	.182	.195	1.118	1.717	28.4	23.4	7.4	7.0	64.2	69.7	71.7
Richmond	.312	.311	.204	.206	1.565	1.642	24.7	23.4	6.5	6.6	68.8	70.0	74.9
Sacramento	.239	.285	.157	.162	.977	1.177	18.6	16.7	10.8	10.3	70.6	72.9	62.7
St. Joseph	.266	.312	.199	.200	1.370	1.443	27.2	29.1	6.3	5.9	66.4	64.9	76.0
St. Paul	.239	.340	.143	.136	1.195	1.544	35.2	35.0	3.7	3.2	61.1	61.9	79.1
Salt Lake City	.265	.330	.199	.195	1.233	1.508	23.8	22.0	8.1	7.6	68.0	70.5	71.4
San Diego	.244	.286	.194	.168	1.174	1.195	22.9	25.2	8.5	7.1	68.6	67.7	70.8
Seattle	.267	.300	.200	.185	1.182	1.317	20.2	19.6	10.2	9.2	69.6	71.3	67.6
Springfield, Mo	.299	.368	.146	.172	1.401	1.720	37.5	35.9	3.2	3.4	59.2	60.7	80.4
Syracuse	.238	.307	.124	.154	1.007	1.331	25.6	21.9	6.4	7.0	68.1	71.1	69.4
Topeka	.288	.333	.188	.162	1.326	1.471	28.3	28.7	6.3	5.1	65.4	66.3	75.0
Trenton	.279	.392	.134	.139	1.354	1.773	38.1	37.8	2.8	2.6	59.0	59.7	81.0
Wheeling	.303	.349	.147	.163	1.317	1.573	37.1	34.5	3.5	3.8	59.3	61.7	78.8
Wichita	.244	.308	.156	.185	1.134	1.392	23.8	21.8	7.0	7.8	69.2	70.4	70.5
Worcester	.261	.314	.204	.206	1.150	1.338	24.1	23.3	9.0	8.6	66.9	68.1	70.6

TABLE 17

Components of Income Inequality

Identical Samples: Owner-occupant; Division at $2,000 in 1929

	COEFFICIENT OF CONCENTRATION				REL. DIFF. BETWEEN INCOMES OF		SHARE OF TOTAL INEQUALITY						
	l group		*u* group		*l* & *u* GROUPS		*l* group		*u* group		*l* & *u* groups		% IN *l* GROUP
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Atlanta	.299	.303	.297	.300	1.159	1.204	5.9	5.5	28.7	28.6	65.4	65.9	47.5
Birmingham	.322	.392	.268	.250	1.219	1.397	10.1	9.2	20.6	19.6	69.3	72.2	55.0
Boise	.296	.339	.198	.202	1.179	1.370	18.7	16.8	11.4	11.1	69.9	72.1	64.6
Butte	.256	.409	.297	.324	1.166	1.567	12.0	10.2	19.5	18.9	68.5	70.9	60.0
Cleveland	.310	.381	.316	.338	1.290	1.471	8.8	7.8	23.0	23.0	68.2	69.1	55.7
Dallas	.284	.310	.288	.272	1.112	1.189	7.1	6.8	27.0	25.3	65.9	67.8	49.4
Des Moines	.280	.339	.282	.291	1.253	1.410	12.1	11.8	18.0	17.5	69.9	70.7	60.7
Erie	.318	.417	.245	.280	1.293	1.631	15.9	13.0	13.8	14.6	70.3	72.4	63.5
Indianapolis	.309	.380	.326	.305	1.197	1.296	5.1	5.1	31.0	28.6	63.8	66.3	46.7
Lansing	.269	.353	.237	.267	1.033	1.252	12.1	11.0	19.6	19.9	68.4	69.1	55.6
Lincoln	.307	.331	.333	.269	1.390	1.447	10.7	10.9	19.9	16.4	69.5	72.6	60.6
Little Rock	.362	.389	.321	.274	1.304	1.365	7.4	7.2	25.7	22.5	66.9	70.3	51.7
Minneapolis	.235	.289	.264	.264	1.078	1.229	9.8	9.3	21.6	20.4	68.6	70.4	55.4
Oklahoma City	.311	.341	.304	.300	1.212	1.314	7.5	6.9	25.4	24.6	67.0	68.5	51.7
Peoria	.292	.335	.294	.275	1.283	1.393	12.0	11.8	18.4	16.9	69.5	71.3	60.4
Portland, Me.	.275	.309	.340	.299	1.234	1.265	6.4	6.9	27.8	24.9	65.8	68.2	51.7
Portland, Ore.	.298	.377	.244	.230	1.217	1.439	15.4	14.3	14.7	13.3	69.9	72.4	62.3
Providence	.277	.318	.308	.318	1.239	1.378	10.0	9.3	21.4	21.0	68.6	69.7	57.8
Racine	.301	.392	.231	.237	1.164	1.568	16.7	12.7	14.2	13.3	69.1	74.0	62.5
Richmond	.281	.263	.304	.245	1.182	1.275	6.0	4.9	28.0	23.4	66.0	71.7	48.8
Sacramento	.256	.327	.270	.255	1.044	1.174	7.9	7.9	25.9	23.5	66.2	68.5	50.1
St. Joseph	.283	.327	.296	.261	1.312	1.430	13.3	13.4	16.7	14.6	70.0	72.0	63.3
St. Paul	.235	.302	.266	.237	1.144	1.292	14.4	15.2	16.2	13.7	69.5	71.1	63.3
Salt Lake City	.306	.359	.286	.233	1.242	1.410	10.9	10.3	20.2	16.2	68.9	73.5	57.5
San Diego	.296	.328	.262	.218	1.231	1.269	14.1	15.2	16.3	13.5	69.6	71.3	61.6
Seattle	.286	.340	.245	.242	1.144	1.333	12.5	11.3	18.0	16.7	69.6	72.0	58.1
Springfield, Mo.	.301	.358	.235	.225	1.375	1.530	21.4	21.2	9.6	9.0	68.9	69.8	70.5
Syracuse	.271	.319	.295	.319	1.126	1.273	8.6	7.6	24.7	25.1	66.7	67.3	52.9
Topeka	.290	.295	.247	.227	1.251	1.404	15.0	12.9	14.5	13.1	70.5	74.0	63.2
Trenton	.252	.336	.227	.220	1.246	1.417	17.6	18.7	11.4	10.5	71.0	70.8	67.4
Wheeling	.367	.393	.217	.231	1.495	1.733	24.3	20.6	8.0	8.3	67.6	71.1	71.8
Wichita	.269	.334	.276	.261	1.276	1.437	13.5	13.3	16.1	14.6	70.4	72.0	62.9
Worcester	.307	.326	.333	.324	1.225	1.281	6.4	6.2	28.5	27.1	65.1	66.7	50.1

changes in the share of total inequality are of substantially the same character as in the entire-city and tenant samples. The relative difference in mean income between the lower and upper groups assumes an increasing proportion of total inequality in 32 samples; the shares of inequality within the lower and upper groups decline in 25 and 27 samples, respectively.[28]

As noted in the preceding section, the 1929 and 1933 Lorenz curves for the entire distribution intersect more frequently among owners than among tenants: while in most owner samples the share of the top incomes in total income declines, in most tenant samples it rises. Our analysis reveals another dissimilarity between the two tenure groups: inequality within the upper group tends to decrease in most owner samples, to increase in most tenant samples.

The convergence of these two conclusions suggests that the change in inequality within the upper group is related to the change in the share of the top incomes in total income; indeed, it must, by virtue of the nature of the two concepts. Inequality in income within the upper group can be understood in terms of the shares of total income received by the various income groups that make up the upper section of the population. Let us distinguish two such groups: the top and the moderately high income recipients. Together, they comprise all the members of the upper group. Declining inequality within it means that the share of the top incomes in the total income of the group declines, while the share of the moderately high incomes increases. Increasing inequality within the upper group means an increase in the share of the top incomes, a decline in the share of the moderately high incomes in the total income of the group.[29] What is the relation between changes in the share of the top incomes in the total income of the upper group and changes in the share of the whole upper group in total income?

Let us call the total income of the lower group L, that of the upper group U, and the total of the top incomes T, where T is, of course, a part of U. The share of the top incomes in the total income of the

[28] In few cases do the Lorenz curves for 1929 and 1933, representing the distributions of income within the lower group or within the upper group, tend to intersect. In 5 out of 99 samples for lower income recipients (entire-city, tenants, and owners), and in 9 out of 99 samples for upper income recipients, such a tendency is observable; but the evidence is doubtful.

[29] This relation is correct when the Lorenz curves for the upper income recipients do not intersect. As said above, such intersection cannot be found in our samples except in a few doubtful instances.

upper group is T/U, in total income $T/(U+L)$. The relation between the two shares is simple:

$$(1)\quad \frac{T}{U+L} = \frac{T}{U} \times \frac{U}{U+L}.$$

The share of the top incomes in total income is the product of their share in the income of the upper group and of the latter's share in total income. Thus there is good reason for the two types of share of the top incomes to vary in the same direction; but evidently this covariation is affected by changes in the share of the upper group in total income.

As remarked, during the depression the share of the lower group declined, and that of the upper group increased, in all the samples studied (see Table 15). In terms of equation (1), $U/(U+L)$ increases. If we take this as a given condition three possibilities for the covariation of the two types of share of the top incomes remain:

a) The share of the top incomes in the total income of the upper group increases. Then their share in total income must increase *a fortiori*.

b) The share of the top incomes in the total income of the upper group decreases, but at a slower rate than $U/(U+L)$ increases. Again their share in total income must increase.

c) The share of the top incomes in the total income of the upper group decreases at a higher rate than $U/(U+L)$ increases. Then their share in total income must decline.

Under (a) and (c), income dispersion within the upper group and the share of the top incomes in total income vary in the same direction; under (b), in opposite directions. In our material (b) is realized very infrequently (Table 18).

In the entire-city and owner samples (c) is realized most frequently; in the tenant samples, (a). In each of the three classes of samples (b) seldom occurs.[80] When, during the Great Depression, the share of the top incomes in the total income of the upper group

[80] Although there is no fourth possibility, one entire-city sample (Portland, Oregon) shows increasing income inequality within the upper group and a decline in the share of the top incomes in total income; the coefficients of concentration for the upper group, 1929 and 1933, are identical in the first three digits. Only when they are computed to more digits does an increase appear. However, the two Lorenz curves of the upper group tend to intersect, which indicates a decline in the share of the top incomes in the total income of the upper group. Therefore, the increase in R_u does not reflect an increase in the share of the top incomes, as it does when there is no intersection of the Lorenz curves pertaining to the upper group. The 'fourth' possibility is therefore fictitious; its appearance is attributable to a slight inexactitude of measurement.

TABLE 18

Changes in the Share of the Top Incomes in Total Income * and in Inequality within the Upper Income Group

	DECLINING SHARE OF TOP INCOMES	INCREASING SHARE OF TOP INCOMES	TOTAL SAMPLES
		Entire-city	
Decreasing inequality within upper income group	20	4	24
Increasing inequality within upper income group	1	8	9
Total samples	21	12	33
		Tenant	
Decreasing inequality within upper income group	10	3	13
Increasing inequality within upper income group	0	20	20
Total samples	10	23	33
		Owner-occupant	
Decreasing inequality within upper income group	20	2	22
Increasing inequality within upper income group	0	11	11
Total samples	20	13	33

* The share of the top incomes in total income has increased when the Lorenz curve for 1933 lies above the curve for 1929 in the upper right-hand corner of the Lorenz chart for all incomes. It has declined when the 1933 curve lies below the 1929 curve in that corner.

For the purpose of this table the top incomes are defined as the group of the highest incomes distinguished in the material. The lower limit of this group is given by the income at the point of intersection, which is indicated in Table 11 for all entire-city samples that show intersection of Lorenz curves.

declined, it tended to fall at such a rate that the share of the group in total income declined too, despite the growing importance of the income of the upper group as a whole. Exceptions to this tendency appear in 4 out of 24 entire-city, 3 out of 10 tenant, and 2 out of 22 owner, samples.

It becomes clear that the two types of share of the top incomes tend to vary in the same direction because of (1) the commonly observed rise in the share of the income of the upper group in total income, and (2) the few cases in which (b) is realized. This tendency appears in the entire-city samples as well as in the separate samples of both tenure groups.

The scarcity of cases in which (b) is realized must be ascribed to a positive correlation between the relative changes in (1) inequality among the upper income recipients and (2) the share of the upper

group in total income. Where income inequality within the upper group decreases most, the share of the group in total income tends to increase least (Table 19 and Chart 13). The coefficient of correlation, based on the 33 entire-city samples in Table 19, is .482 (see Chart 13).

TABLE 19

Percentage Changes in Inequality within the Upper Group and in the Share of Total Income Held by It

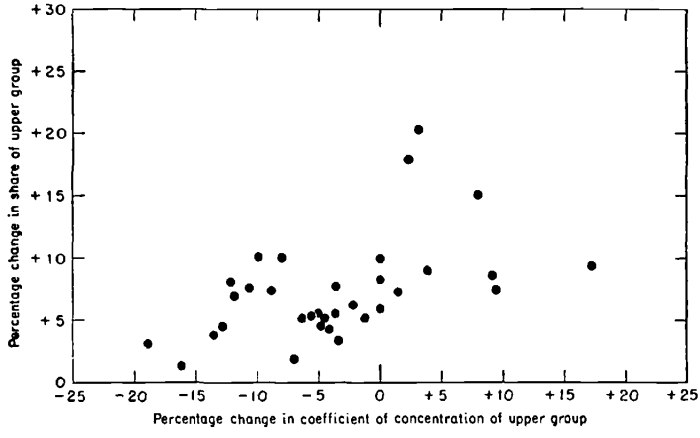
Identical Samples: Entire-city

	PERCENTAGE CHANGES IN*	
	Coefficient of concentration for u group	Share of total income held by u group
Atlanta	−1.2	+5.2
Birmingham	−9.9	+10.1
Boise	+9.4	+7.3
Butte	+3.1	+20.2
Cleveland	−3.6	+7.7
Dallas	−3.4	+3.3
Des Moines	0	+5.9
Erie	+7.9	+15.0
Indianapolis	−6.4	+5.1
Lansing	+17.2	+9.4
Lincoln	−13.5	+3.8
Little Rock	−12.8	+4.5
Minneapolis	−5.1	+5.5
Oklahoma City	−5.6	+5.3
Peoria	−4.6	+5.1
Portland, Me.	−18.9	+3.1
Portland, Ore.	0	+9.9
Providence	−2.2	+6.2
Racine	+2.3	+17.9
Richmond	−10.6	+7.6
Sacramento	−3.7	+5.5
St. Joseph	−7.0	+1.9
St. Paul	−12.2	+8.1
Salt Lake City	−11.8	+6.9
San Diego	−16.2	+1.3
Seattle	−8.9	+7.4
Springfield, Mo.	0	+8.3
Syracuse	+3.9	+9.0
Topeka	−4.8	+4.6
Trenton	−8.0	+10.0
Wheeling	+9.1	+8.0
Wichita	+1.4	+7.3
Worcester	−4.2	+4.3

* The percentage change in the coefficient of concentration, 1929–33, is from Table 13, col. 3 and 4. The percentage change in the share of total income is the percentage change in the complements (to 100) of the percentages in Table 15, col. 1 and 2.

CHART 13

Percentage Changes in the Share of Total Income Held by, and in the Coefficient of Concentration for the Upper Group



b OTHER DATA

The Old-Age and Survivors Insurance data, which are confined to the lower strata, confirm our results concerning income inequality within the lower group: it increases during the business recession of 1937–38 and decreases during the subsequent recovery (Table 20 and Charts 14 and 15).[31] However, in 1940 the degree of inequality stays above its 1937 level, although the mean income exceeds that of 1937.

The Wisconsin distributions were split at the $2,000 point in 1929 net incomes, the Delaware distributions at $2,000 of total income in 1936, so that the lower group accounts for 68.4 and 81.1 per cent respectively. In the case of Germany, the split was made at RM3,000 in 1928, the percentage of the lower group being 89.6.[32]

The Wisconsin data fit rather well into the general picture. From 1929 to 1936 income inequality within the lower group tends to

[31] Since the distributions of taxable wages yielded by the Old-Age and Survivors Insurance for 1937, 1938, 1939, and 1940 cover wages and salaries from zero up to about $3,000, they can be associated with the other distributions for low income groups. Experimentally, the 1937 and 1938 distributions were split at $2,000 for 1937. The two sectional distributions show the same tendency toward increasing inequality during the recession.

[32] Only two broad income classes, comprising about 60 and 30 per cent of total income recipients, are distinguished below RM3,000. Since an interpolation within these classes would not greatly affect the outcome of the analysis, and since it would have to be rather arbitrary, we did not lower the dividing point.

TABLE 20

Components of Income Inequality

Nonidentical Samples: Delaware, Wisconsin, Old-Age and Survivors Insurance, and Germany

	MEAN INCOME	COEFFICIENT OF CONCENTRATION		REL. DIFF. BETWEEN INCOMES OF l & u GROUPS	SHARE OF TOTAL INEQUALITY			% IN l GROUP
		l group	u group		l group	u group	l & u groups	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(dollars)	*Delaware, state income tax data*						
1936	1,832	.436	.621	3.225	16.3	11.6	72.1	81.1
1937	1,906	.419	.589	2.973	18.3	11.2	70.5	81.1
1938	1,699	.405	.519	2.799	20.3	9.9	69.8	81.1
		Wisconsin, state income tax data						
1929	2,024	.201	.317	1.191	15.8	15.3	68.9	68.4
1934	1,286	.248	.254	1.208	19.0	12.2	68.8	68.4
1935	1,417	.234	.252	1.147	19.0	12.4	68.6	68.4
1936	1,584	.235	.283	1.177	18.4	13.6	68.0	68.4
		U. S. Old-Age and Survivors Insurance data						
1937	900	.466	...	...	...	...	...	100.0
1938	844	.485	...	...	...	...	...	100.0
1939	877	.479	...	...	...	...	...	100.0
1940	908	.473	...	...	...	...	...	100.0
	(Reichsmarks)	*Germany, income and wage tax data*						
1926	1,486	.154	.330	3.046	22.3	3.4	74.3	89.6
1928	1,723	.173	.333	2.997	24.7	3.4	71.9	89.6
1932	1,168	.235	.256	3.306	28.0	2.5	69.5	89.6
1934	1,321	.268	.276	3.061	33.3	2.5	64.3	89.6
1936	1,735	.239	.334	2.816	31.9	3.4	64.7	89.6

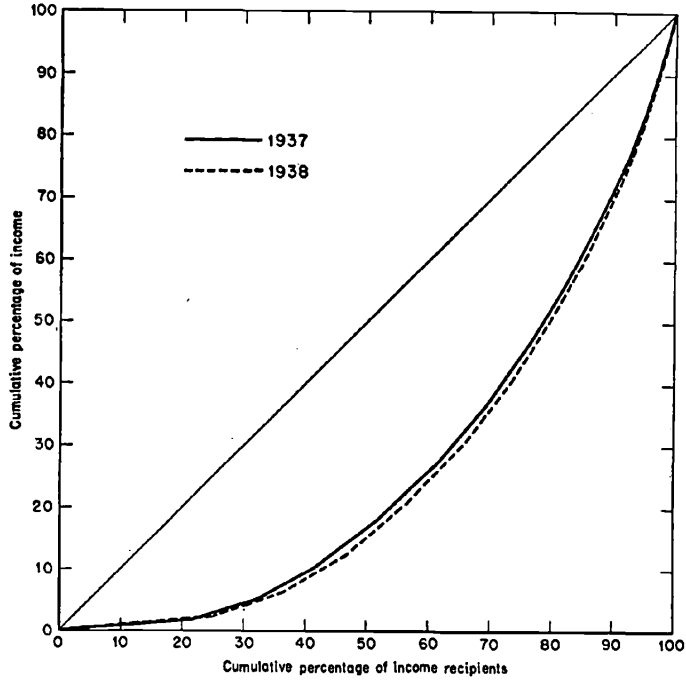
increase as average income declines, and *vice versa;* while changes in inequality within the upper group seem *positively* correlated with changes in average income. Minor exceptions are observed for 1935–36 (R_l') and 1934–35 (R_u').[33] The relative difference in mean income between the lower and upper groups, however, does not conform well to our previous observations: its lower values for the relatively depressed years 1935 and 1936 do not agree with the thesis that it varies inversely with changes in income level.

The German tax data also support and supplement our finding

[33] The Lorenz curves for the 1935 and 1936 distributions of the lower group intersect, as do those for the 1934 and 1935 distributions of the upper group. Not much importance can be attributed to these intersections since the curves practically coincide over the entire range of a 10 square-inch Lorenz chart.

CHART 14

Lorenz Curves, 1937 and 1938
Old-age and Survivors Insurance

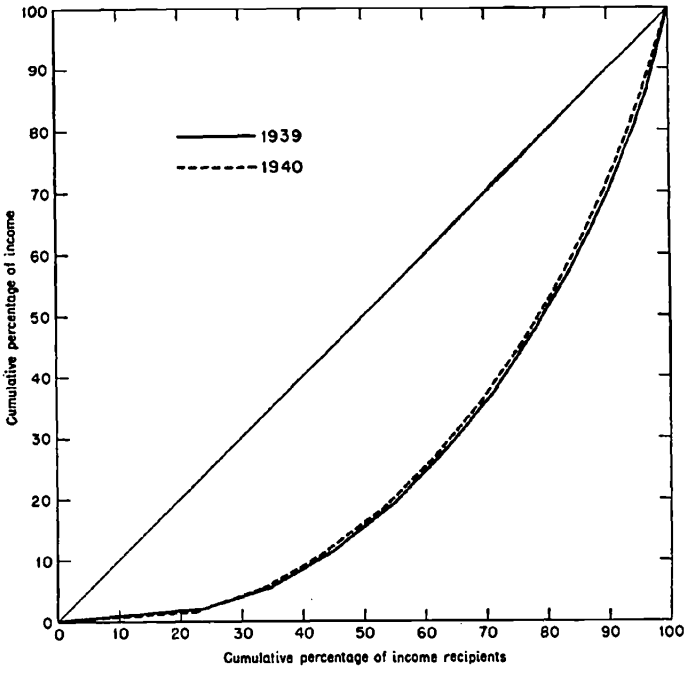


that income inequality within the upper group varies positively with the cycle of income level, and that the relative difference in mean income between the lower and upper groups varies inversely. It is true that income inequality within the lower group does not show any clear-cut correlation with income level; but wage distributions from German invalidity insurance records seem to show the same type of change in inequality for the cycle as we find characteristic of the lower income groups. In measuring inequality in these distributions for each quarter of the seven years 1928–34, Hans Staehle remarked that the variations "are by no means similar to those of other series characterizing the business cycle".[34] This dissimilarity should not, however, be interpreted to mean absence of correlation. To be sure, there is no positive correlation between the degree of inequality and income level, measured by the median income of the included workers; but there is evidence of a negative

[34] 'Short-period Variations in the Distribution of Incomes', *Review of Economic Statistics*, Aug. 1937, pp. 137, 142.

CHART 15

Lorenz Curves, 1939 and 1940
Old-age and Survivors Insurance



correlation. The coefficient of rank correlation between the two variables is —.79, significantly different from zero. Considering the signs of differences between consecutive items in the two series, we find that changes in the degree of inequality and those in the median have opposite signs in 19 out of 27 cases, the same sign in only 8 cases. Thus, Staehle's data support our thesis that income inequality among the lower groups tends to increase in depression and to drop in prosperity.

The Delaware data behave in an entirely different fashion, 1936–38, but we do not know why. All elements of income inequality decline in all its aspects: within and between the lower and upper groups, irrespective of the cyclical changes in income level that can be observed.

Except for the two cases mentioned in footnote 34, the Lorenz curves constructed separately for the lower and the upper groups in different years do not intersect. Whenever one curve lies to the right (below) of the other, it does so over the entire income range.

Consequently, the corresponding coefficients of concentration give an unequivocal picture of the change in inequality over time. Thus, when the data indicate declining income inequality within the total upper group, the share of the top incomes in its total income declines, whatever the lower limit of that group of top incomes is assumed to be. A corresponding situation is found for the lower group.

Our findings in this section indicate that we must not expect the degree of inequality in the income distribution as a whole to vary in the same direction as the degree of inequality within the upper income strata. A measure of the second cannot be taken as an indicator of the first. The consequences of such a procedure are observable in a study of factors influencing consumption in the United States.[35]

Polak investigated the partial correlation between aggregate consumption and income inequality. In the absence of more suitable data, he used measures of inequality within the upper income group and found that the partial regression coefficient "invariably had a wrong sign".[36] Economic theory to the contrary, it appeared that greater inequality in incomes was associated with greater consumption, and conversely. This surprising result is probably explained by the negative correlation between the changes in inequality within the entire distribution and within the higher income groups. In aggregate national consumption, it is the former that matters; or perhaps even inequality within the lower 60 or 80 per cent of the income distribution. Our results point toward the expected negative correlation between changes in either of these two and the cyclical changes in national consumption.

C OTHER APPROACHES TO THE ANALYSIS OF SECTIONAL INEQUALITY

We may now test whether our results depend upon the particular techniques followed.

1) With the principle of splitting the income distribution into two sections maintained, will a lowering or raising of the dividing point affect the results?

[35] J. J. Polak, 'Fluctuations in United States Consumption', *Review of Economic Statistics*, Feb. 1939. Pareto slopes, used as measures of income inequality, are computed from sections of the federal income tax distribution above $5,000 net. The rather inadequate index of wage inequality, used in addition, cannot be regarded as a measure of income differences within the lower sections of the income distribution.

[36] *Ibid.*, p. 5. Similar 'wrong signs' appear in J. Tinbergen's study: *Business Cycles in the United States of America, 1910–1932* (Geneva, 1939), pp. 35–8, 234.

ii) What would the results be were the distribution split into more than two sections?

iii) Would the analysis of income inequality within and between sections yield different results were coefficients of variation used instead of coefficients of concentration?

iv) Are the results similar for usable and identical samples?

i) *Location of the dividing point*

A lowering or raising of the dividing point is bound to produce the following effects: First, if the dividing point is lowered, the share, in total inequality, of inequality within the lower group will decline, while the share within the upper group will increase; conversely, if the dividing point is raised. Second, a considerable lowering of the dividing point will tend to reverse the results obtained for the change in the degree of inequality within the upper group, since the latter will comprise an ever larger part of the entire distribution and income inequality among its members will tend merely to reflect that in the entire distribution. Third, where the Lorenz curves for the entire distribution intersect in the manner previously discussed, raising the dividing point above the income level at which intersection occurs will affect the change in relative difference in mean income between the lower and upper groups. It is difficult to determine just what the effect of lowering the dividing point would be.

It seems impossible to determine *a priori* the effect of a higher dividing point on changes in inequality within the upper group. Where this form of inequality declines under the previous procedure, it is not likely to increase with a higher dividing point. The results of Goldenthal's study support this assertion. When income inequality within the upper group increases under the previous procedure, the effect of a higher dividing point cannot be predicted.

To ascertain the effect of raising the dividing point, we experimented with 10 owner samples of the Financial Survey. When the dividing point was raised from $2,000 to $3,000 of 1929 income the range of percentages of owner families designated as in the lower group rose in the 10 cities from 47.5–67.4 (Table 17, col. 13) to 71.8–87.4 (Table 21, col. 13).

Comparison of the corresponding entries in Tables 17 and 21 reveals that nearly all coefficients of concentration for the lower group are raised, while the great majority of those for the upper

TABLE 21

Components of Income Inequality

Identical Samples: Owner-occupants; Division at $3,000 in 1929

	COEFFICIENT OF CONCENTRATION				REL. DIFF. BETWEEN INCOMES OF		SHARE OF TOTAL INEQUALITY						
	l group		*u* group		*l* & *u* GROUPS		*l* group		*u* group		*l* & *u* groups		% IN *l* GROUP
	1929	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	*1929*	*1933*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Atlanta	.295	.317	.266	.260	1.538	1.588	19.5	19.7	10.0	9.6	70.5	70.6	71.8
Butte	.260	.414	.300	.287	1.896	2.406	30.0	31.7	5.4	4.7	64.6	63.6	83.1
Cleveland	.310	.389	.296	.301	1.891	2.128	24.5	25.2	7.3	7.0	68.2	67.9	78.6
Minneapolis	.250	.312	.249	.235	1.635	1.775	28.9	30.9	5.4	4.9	65.6	64.3	80.7
Providence	.282	.336	.287	.306	1.925	2.077	26.7	27.7	5.9	6.2	67.4	66.0	81.0
St. Paul	.254	.315	.288	.219	1.906	2.050	36.0	39.0	3.9	2.8	60.1	58.2	85.9
San Diego	.299	.338	.261	.180	1.950	1.841	36.4	41.8	3.8	2.4	59.8	55.8	85.0
Seattle	.286	.363	.237	.204	1.723	1.869	34.4	37.5	4.2	3.5	61.3	59.0	82.8
Topeka	.304	.337	.242	.229	1.875	1.974	37.0	37.7	3.6	3.4	59.3	58.9	84.5
Trenton	.282	.359	.214	.161	1.954	2.077	42.2	46.0	2.4	1.6	55.4	52.3	87.4

group are lowered. In all cases the relative difference between the mean incomes of the lower and upper groups is increased. The shares of total inequality ascribable to income inequality within the upper group and to the relative difference in mean income levels between the lower and upper groups are decreased (the second, except Atlanta). In total inequality, the share of inequality within the lower group increases throughout.

Raising the dividing point affects somewhat the outcome of our comparisons of owner distributions in 1929 and 1933. Income inequality within the lower group increases as before; but that within the upper group declines more frequently than when the distribution was split at $2,000 (1929). Declines occur in 8 of the 10 cities, whereas they previously occurred in 5, and the increase in Cleveland is much smaller. In Providence, however, the increase is more pronounced, and in Topeka the decline is slightly less pronounced. There is some evidence that raising the dividing point brings out more definitely the decline in income inequality within the upper group.

The relative difference in mean income between the two groups tends to increase, as with the former splitting procedure; but at a somewhat lower rate in 9 cities, and in San Diego there seems to be a decline. In short, as one might expect, raising the dividing point reduces somewhat the frequency and degree of the increase in the relative difference in income levels between the two groups during the depression.

In total inequality, the share of inequality within the upper group drops as it did before; but all or most of the decline is now absorbed by the degree within the lower group. The share of the relative difference in income level between the two sections tends to decline, in contrast to the effect when $2,000 was the dividing point.

ii) *Threefold division of the income distribution*

If we were to divide the income distribution into more than two subsections the number of income groups in the original data would have to be fairly large if inequality within each of the several subsections were to be measured. Since a division of 11 income groups into more than two would yield little information, it was not attempted for any of the 33 cities.

Data for the aggregate of the 33 city samples are presented in *Residential Real Estate* (p. 151 ff.) with a breakdown into 39 income

groups, enough to permit a subdivision of the distribution into three, or even more, sections, each containing a fair number of income groups. We used this material, therefore, for a threefold division of the income distribution.

Table 22 shows the effects of dividing the distributions for 1929 and 1933 into two sections, by the procedure followed in the previous analyses. With the dividing point at $2,000 in 1929, 63 per cent are classed as lower income recipients, 37 per cent as upper. The results for the aggregate of the 33 cities follow the general pattern of the individual city studies. Income inequality within the lower group and the relative difference in income levels between the lower

TABLE 22

Components of Income Inequality

Usable Samples: Aggregate of 33 Cities

	1929	1933
Division into upper and lower income groups (dividing point at 63 per cent of the 1929 income distribution: at $2,000 in 1929)		
Coefficient of concentration		
l group	.301	.369
u group	.282	.270
Relative difference between incomes of *l* and *u* groups	1.270	1.464
Share of total inequality		
l group	14.5	14.0
u group	16.2	14.8
l and *u* groups	69.3	71.2
Division into 3 groups: low, middle, and high (dividing points at 33.3 and 66.7 per cent of the 1929 income distribution)		
Coefficient of concentration		
Low	.327	.380
Middle	.087	.124
High	.280	.266
Relative difference between incomes of		
Middle and low	.492	.545
High and middle	1.092	1.262
High and low	1.584	1.807
Share of total inequality		
Low	2.6	1.9
Middle	1.9	2.3
High	13.8	12.3
Low and middle	12.8	12.7
Middle and high	28.2	29.2
Low and high	40.8	41.7

and upper groups increase during the depression, while inequality within the upper group declines. The relative difference in mean income between the two groups assumes an increasing share of total inequality at the expense of both forms of intragroup inequality.

In splitting the distributions into three sections we chose the two dividing points so as to have three numerically equal groups of income recipients—low, middle, and high. The high is almost identical with the upper group of the two-section breakdown. The additional subdivision affects primarily the group previously designated lower. In 1929 the low group ranges from zero to about $1,200 (comprising 13 income groups); in 1933, from zero to about $600 (7 groups). The middle group ranges from about $1,200 to about $2,000 (8 groups) in 1929; and from about $600 to about $1,400 (9 groups) in 1933. The high group comprises in 1929 all incomes above about $2,000 grouped in 20 classes; in 1933 all above about $1,400 grouped in 25 classes.[37]

Income inequality within the high group follows the same course as those within the upper group in the two-section analysis; that is, it declines from 1929 to 1933. The tendency toward increasing inequality previously observed for the lower group holds true both within the low and middle groups and in the relative difference between the income levels, indicating a certain homogeneity of the lower group in the two-section analysis from the viewpoint of changes in inequality during the depression.

III and IV) *Inequality within sections measured by coefficients of variation, in usable samples*

The third and fourth problems are treated jointly. We analyzed the usable samples for tenants in 10 cities, as in the first problem. Tenant samples were taken because *Residential Real Estate* contains breakdowns into 39 groups only for the 1929 and 1933 tenant income distributions. The use of this fine breakdown seemed advisable for the purpose of comparing the behavior of the two types of inequality measure.

As shown above, both the usable and identical samples reveal increasing coefficients of concentration for the entire distribution 1929–33 (see Ch. 1). Changes in the coefficients of variation for the usable samples parallel those in the identical samples: they increase in 7 cities, and decrease in San Diego, Seattle, and Topeka, where

[37] In each year groups number 41, two more than the original number in the material, inasmuch as the divisions split two groups into four subgroups.

decreases were observed in the identical samples as well (Table 23, col. 4).[38]

Income inequality within the lower section follows the course traced by the identical tenant samples, regardless of the measure used. Both the v_l' and the R_l' increase in all cities studied. The relative difference in income level between the lower and upper groups increases throughout.

Changes in the coefficients of concentration for the upper section parallel those in the identical samples, with the sole exception of Cleveland. The coefficients of variation change in the same direction, except for St. Paul and Trenton; however, in the former the two measures are practically constant for the two years.[39]

In conclusion, we may say that the analysis of inequalities in

[38] See Table 6. It can be explained at this point why the increase in aggregate inequality 1929–33 is brought out less clearly by the coefficients of variation than by the coefficients of concentration. While the latter increase in all tenant samples, the former decrease in San Diego, Seattle and Topeka.

The explanation lies in the different weights given inequality within the upper group in the two measures, which in turn is explained by the fact that deviations among incomes are taken as simple differences in the case of R' but as squared differences in the case of v'. The squaring emphasizes the deviations of the more widely scattered high incomes from their mean.

For the 10 tenant samples the share of inequality within the upper group in aggregate inequality is much higher (4 to 8 times) in the coefficient of variation than in the coefficient of concentration. The prevalent decline in inequality within the upper group during the depression is, therefore, more likely to produce declines in the coefficients of variation for the entire distribution than in the coefficients of concentration.

Percentage Share of Inequality within the Upper Group in Aggregate Inequality
Tenants, Usable Samples

	COEFFICIENT OF VARIATION		COEFFICIENT OF CONCENTRATION	
	1929	*1933*	*1929*	*1933*
Atlanta	41.0	43.6	6.3	6.6
Butte	58.8	45.2	12.7	10.7
Cleveland	60.7	59.1	13.2	12.8
Minneapolis	61.4	54.0	10.9	9.5
Providence	56.4	50.0	9.2	8.0
St. Paul	28.5	24.5	4.8	4.3
San Diego	59.9	38.2	10.2	8.7
Seattle	65.2	44.8	12.1	10.6
Topeka	52.7	31.9	7.7	6.3
Trenton	31.0	20.7	3.8	3.6

[39] The standard deviations in Table 23, col. 3, are consistently larger than those for the identical sample in Table 6, col. 5 and 6, because the finer breakdown into 39 groups leaves less room for the neglected intragroup variation. For the same reason the coefficients of variation (col. 4) and coefficients of concentration (col. 8, 9, and 10) consistently exceed those obtained in the 11-class analysis of the identical sample. Compare with Table 6, col. 7 and 8, Table 7, col. 7 and 8, and Table 16, col. 1–4.

TABLE 23

Components of Income Inequality

Usable Samples: Tenant; Data Based on 39 Classes

	TOTAL NO.	MEAN INCOME	STANDARD DEVIATION	COEFFICIENT OF VARIATION			REL. DIFF. BETWEEN INCOMES OF	COEFFICIENT OF CONCENTRATION			% IN *l* GROUP
				All	*l* group	*u* group	*l* & *u* GROUPS	All	*l* group	*u* group	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		(dollars)									
Atlanta '29	8,327	1,411	1,469	1.041	.547	.589	1.700	.461	.345	.219	76.0
'33	9,514	979	1,188	1.213*	.711*	.650*	1.992	.517	.399	.231	
Butte '29	1,801	1,880	1,622	.863	.444	.673	1.069	.355	.246	.245	67.5
'33	1,999	991	1,134	1.144*	.738*	.626	1.714	.515	.423	.242	
Cleveland '29	22,333	1,847	1,880	1.018	.533	.744	1.238	.408	.303	.248	65.4
'33	27,350	1,143	1,356	1.186*	.651*	.782*	1.505	.475	.374	.258	
Minneapolis '29	7,826	1,778	1,605	.903	.412	.720	1.112	.349	.232	.224	69.0
'33	9,270	1,222	1,174	.960*	.541*	.678*	1.316	.410	.314	.214	
Providence '29	5,048	1,660	1,531	.922	.445	.698	1.250	.367	.251	.246	72.8
'33	5,884	1,134	1,168	1.030*	.573*	.668	1.504	.436	.327	.230	
St. Paul '29	1,630	1,499	1,009	.673	.453	.400	1.171	.332	.254	.174	77.9
'33	1,827	1,062	873	.822*	.634*	.403	1.482	.418	.355	.172	
San Diego '29	3,651	1,728	1,592	.921	.453	.716	1.149	.363	.255	.219	69.0
'33	4,800	1,194	939	.786*	.516*	.478*	1.204	.380	.296	.187	
Seattle '29	5,051	1,802	1,840	1.021	.491	.799	1.165	.377	.281	.222	65.8
'33	5,978	1,109	1,026	.925*	.554*	.557*	1.369	.422	.319	.204	
Topeka '29	1,694	1,564	1,470	.940	.529	.678	1.301	.388	.303	.221	73.6
'33	2,074	1,072	934	.871*	.602*	.461*	1.465	.426	.345	.186	
Trenton '29	1,769	1,347	1,024	.760	.515	.456	1.327	.363	.291	.165	79.7
'33	2,081	902	827	.917*	.690*	.383*	1.783	.469	.395	.175	

* Statistically significant change in coefficient of variation 1929–33.

income within and between the two sections of the distribution would lead to substantially the same results were coefficients of variation rather than coefficients of concentration used, or were the usable rather than the identical samples studied.

4 *Suggested Explanations of the Observed Changes in Income Inequality*

The preceding analysis has revealed characteristic changes in three features of income inequality. Income inequality within the lower group (lower 50-70 per cent) and relative differences in mean income between the lower and upper groups increase from prosperity to depression, while inequality within the upper group (upper 30-50 per cent) tends to decline. The composite effect of these changes is an increase in inequality within the income distribution as a whole: a decreasing proportion of total family income goes to the lower income groups. However, the corresponding increase in the share of the upper group in total income is unevenly distributed among its members. While the share of the group as a whole increases, that of the top 5, 10, up to 20 per cent tends to decline. This is not true of all 33 cities; but with few exceptions it is true wherever income inequality within the upper group declines. Where income inequality within the upper group increases during the depression—as it does in a minority of entire-city and owner samples, and in a majority of tenant samples—the share of the top incomes in total income increases too.

Supplementary data indicate a reversal of these tendencies in the expansion phase of the cycle. However, the evidence is less definitive than for the contraction phase.

Various theories might be advanced to account for these tendencies. The present discussion is confined to the presentation and partial verification of a few simple hypotheses.

a INEQUALITY WITHIN THE LOWER GROUP

The inverse correlation between changes in the income level and the degree of inequality within, roughly, the lower two-thirds of income recipients can be explained by variations in unemployment and, to some extent, in wage rates. There are three contributing factors: (i) changes in the significance of the income gap between the employed and the unemployed, (ii) uneven incidence of unemployment among low- and high-pay employees, and (iii) changes in wage differentials between low- and high-pay workers.

i) *Changes in the significance of the income gap between the employed and the unemployed*

Unemployment during depressions pushes numerous income recipients into the bottom income group. Some of the unemployed are deprived of all income, others receive small amounts from part time work or some form of relief. The unemployed command much smaller incomes than those who stay employed since a loss of employment usually brings about a much greater curtailment of income than a reduction in the rate of pay. Thus the situation of the lower income groups is characterized during depressions by a mass of extremely low incomes earned by the wholly or partly unemployed, and by another class, fairly large, of low incomes earned by workers whose employment is impaired only slightly, if at all. Inequality is thus accentuated by the income gap between the employed and unemployed.[40]

With recovery the unemployed are reabsorbed by industry. Their incomes rise more rapidly than those of persons who have enjoyed stable employment. As unemployment declines, income inequality within the lower income groups becomes in the main a matter of inequality between rates of pay. The closing of the gap between the employed and unemployed brings about a decline in income inequality within the lower income groups.

This theory could be verified by income records of a representative sample of workers, among whom some kept their jobs during the depression while others lost theirs. Such data are not, apparently, available at present. At the end of this section we discuss a tentative verification based on rather unsatisfactory data.

ii) *Incidence of unemployment among low- and high-pay employees*

Unemployment might not cause greater income inequality within the lower group if it fell more heavily on the upper strata of the working class, less on the lower strata. If members of the upper wage groups tended to suffer proportionately greater losses of income through unemployment than members of the lower wage groups, relative income dispersion within the lower group might decline. In reality, however, the incidence of unemployment is likely to vary in the opposite direction, the lower wage groups suffering more

[40] See Simon Kuznets, 'National Income', *Encyclopaedia of the Social Sciences* (Macmillan, 1933), XI, 223.

than the upper (and all wage earners more than salaried workers and business men, for that matter). The need for supervisory and skilled personnel tends to depend less on output than the need for unskilled labor. In many industries, workers of the first category are 'fixed assets' to their employers, since their presence is necessary even for below-capacity production and they cannot be replaced as easily as unskilled workers. Therefore, skilled and supervisory workers are more firmly attached to their employers and retain their jobs longer than unskilled. It seems probable that the incidence of unemployment varies inversely with the level of skill and income of the working group and its rank in the production hierarchy.

The Census for 1940 confirms this hypothesis in general. The proportion of unemployed among nonfarm laborers was three times higher than among craftsmen, operatives, foremen, and service workers; four times higher than among clerical workers; and fifteen times higher than among proprietors, managers, and officials. Within each group, except male laborers, the percentage of unemployed was higher among negroes than among whites (Table 24).

TABLE 24

Unemployed (incl. workers on public emergency projects) as a Percentage of the Experienced Labor Force, 1940

Nonfarm occupations, both sexes

Proprietors, managers, and officials	2.5
Professional and semi-professional workers	5.8
Clerical, sales, and kindred workers	9.5
Craftsmen, foremen, operatives, and service workers	12.4
Laborers	36.7
All nonfarm occupations	13.2

Sixteenth Census of the United States, 1940
Population, III, Part 1, 87.

The uneven incidence of unemployment tends to accentuate income inequality within the lower income groups in depressions. Unemployment accentuates the income differential between the very lowest and moderately low incomes. Therefore, inequality within the lower group tends to grow with a rise, and to recede with a fall, in unemployment.

iii) *Changes in wage differentials of low- and high-pay workers*
In view of the unequal incidence of unemployment, the rates of remuneration of high- and low-pay workers may be expected to

differ more in depression than in prosperity. Members of the first group are better able to ward off wage cuts, since the unemployed reserve army exerts less pressure on the workers in the higher groups who cannot easily be supplanted. In addition, the upper strata of many occupations tend to be more firmly organized; wage reductions are likely to be relatively small where unions are strong. Thus the bargaining position of low- and high-pay workers may become more unequal in depression, less unequal in a revival of business activity.

A study of hourly earnings in different occupations and industries by J. T. Dunlop indicates that in most occupations the lower quartile of the distribution of earnings fell by a greater percentage than the upper quartile during the depression (1929–32), and rose by a greater percentage during the subsequent recovery (1933–37).[41] In other words, relative differences in hourly earnings of men in the same industry and occupation are inversely correlated with the general level of income: they increase in depression and decline in prosperity.

Dunlop's investigation does not reveal parallel variations in the inequality of hourly earnings between the different occupations of an industry. During the Great Depression, earnings of the best-paid occupations and of common laborers—within an industry—declined relatively little, while those of certain intermediary occupations fell relatively much. The recovery in hourly earnings between 1933 and 1937 was least marked in the occupations at both ends of the scale. Similarly, data collected by the National Industrial Conference Board for 21 industries do not show a definite increase in the differential between the hourly earnings of unskilled workers on the one hand, and skilled and semiskilled workers on the other hand, during the Great Depression. In 1929 hourly earnings of unskilled workers represented 72.8 per cent of hourly earnings of skilled and semiskilled workers combined, for an average of 21 industries. In 1930 this percentage fell to 72.1, indicating a slight increase in the differential; but in 1931 it rose to 72.6. Nineteen hundred and thirty-two brought a new decline, to 71.6, and 1933 another rise, to 72.9.[42] The rise continued into 1934 (74.5 per cent) and 1935 (74.6 per cent); but its cause must be sought in the wage stipulations

[41] 'Cyclical Variations in Wage Structure', *Review of Economic Statistics*, Feb. 1939, pp. 32, 33. The tendency is observed primarily among male workers.

[42] Omar Pancoast, Jr: *Occupational Mobility, Democratic Efficiency through the Use of Human Resources* (Columbia University Press, 1941), p. 54.

of the NRA rather than in the improvement of business conditions. At the end of the NRA, the prosperity year 1936 witnessed a sharp decline in the percentage, to 72.7. No clear-cut relation between wage differentials and fluctuations in employment is revealed.

While Dunlop's study indicates that the Great Depression brought increasing differences in hourly earnings between low- and high-pay workers within occupations, an investigation by Carrie Glasser shows simultaneous increases in interindustry wage differentials. The coefficients of variation of hourly entrance rates and of hourly earnings of male unskilled labor, measured for several manufacturing industries, increased greatly from 1929 to 1932 (Table 25). Both coefficients declined from 1932 to 1933 without reaching their 1929 level. From 1933 to 1936 interindustrial differences in hourly entrance rates declined greatly; but those in hourly earnings rose somewhat.

TABLE 25

Changes in Interindustry Wage Differentials
Coefficients of Variation

	1929	*1932*	*1933*	*1936*
Average hourly entrance rates, 13 industries (BLS)	10.5	24.8	19.0	9.0
Average hourly earnings, 21 industries (NICB)	11.2	13.9	11.8	12.1

Carrie Glasser: *Wage Differentials, The Case of the Unskilled Worker* (Columbia University Press, 1940), p. 96.

Thus there is some evidence that differentials in basic wages increased during the Great Depression both between different grades of skill within occupations (Dunlop) and among industries (Glasser), and declined during the subsequent recovery. There is no definite evidence, however, that similar fluctuations in wage differentials occurred among different occupations and broad skill groups within industries.

The unemployed income recipients are almost all in the lower income group, regardless of what group they may have belonged to in an earlier year; and a large proportion of the lower income group, greater in prosperity and smaller in depression, consists of employed income recipients. Hence, the increase from prosperity to depression in the income gap between the employed and the unemployed, suggested under (i) above, would serve to increase inequality within the lower income group, regardless of the fact that the lower in-

come group is not confined to the same families in the two years.

On the other hand, the hypotheses under (ii) and (iii), concerning increasing wage differentials and greater incidence of unemployment in depression among low- than among high-pay workers, can be strictly applied only for lower income groups that are of *identical* composition in the various years of comparison. Our data do show a shift between 1929 and 1933 in the position of families with respect to the dividing point, i.e., from the upper to the lower income group and conversely: the percentage of families shifting position with respect to the dividing point ranges from 11 to 26 (Table 31, Ch. 3). Since the lower income groups in our material are not identical in the various years it is uncertain whether the conditions described would contribute to the observed increase of inequality within the lower group.

For this and other reasons it is impossible here to assess the degree to which the observed correlation between decline in income level and increase in income inequality within the lower group is attributable to income disparities between employed and unemployed, or to variations in wage differentials among the employed, within or between occupations and industries. It is probably due to a combination of these factors. Certainly, it is not confined to particular industries or localities, for it appears in many cities with markedly different industrial structures. An explanation in terms of such universally relevant factors as the level of employment and wage differentials between workers of different skills therefore seems indicated. Variations in these factors may provide a satisfactory basis for an explanation of the observed tendencies in the lower income groups, both within and between localities and industries.

b INEQUALITY WITHIN THE UPPER GROUP

Cyclical changes in the degree of inequality within the upper group must be explained by the cyclical behavior of the types of income receipts most characteristic of the higher income strata: salaries, income from property, and entrepreneurial withdrawals. These types show cyclical variations of unequal amplitude. Several of the income types that spring from property vary concomitantly with the business cycle; in particular, dividends and capital gains—residual payments and windfall profits (losses)—which are bound to be greatly affected by changes in business conditions. Other incomes from property, such as interest, rents, and royalties, tend to fluctuate

less, because they are fixed by contract for certain periods and cannot be adjusted rapidly to changes in business conditions.

Salaries are subject to relatively slight cyclical variations, again, because of stability of contract. Wages and salaries of the upper group varied less during a recent business cycle than all other types of income taken together (Table 26). Apparently, the tendency for certain kinds of property income to fluctuate violently renders this type of income as a whole more variable than salaries.

TABLE 26

Cyclical Variations in the Total Income of the Upper Group and Share of the Top Incomes, Three Types of Payment

TYPE OF PAYMENT	% SHARE OF TOP INCOMES IN TOTAL INCOME OF UPPER INCOME GROUP FROM VARIOUS SOURCES			RATE OF CHANGE IN TOTAL INCOME OF UPPER INCOME GROUP FROM 1929 TO 1933 1933 TO 1936 as a % of	
	1929	*1933*	*1936*	*1929*	*1933*
From work					
Salaries, wages, commissions, etc.	46	24	30	−33	+55
Mixed					
Income (profits minus losses) from business & partnership	63	43	55	−67	+84
From property					
Dividends, rents, royalties, interest, capital gains minus capital losses, & other income	86	44	70	−71	+93

Statistics of Income for 1938, Part I (U. S. Treasury Department, 1941), pp. 68–75. Total income of the upper income group is the total amount shown on all federal income tax returns from individuals, estates, and trusts in the stub. Total of top incomes is the amount shown on returns with net income above $5,000.

Income from business and partnerships occupies an intermediate position with respect to cyclical flexibility. Part may be considered income from entrepreneurial work (wages of management); another part, income from property (profits or losses). If the two parts could be separated it might be found that wages of management fluctuate less than profits, because independent managers honor tacit contracts—with themselves—to much the same degree as corporate managers honor explicit contracts.

The recipients of top incomes get a larger share of income from property than of income from work. Although there is no rigid limit to salaries, most people have to rely heavily on income from

property in order to achieve a very high income. Differences in individual properties, inherited or accumulated by their owners, is known to be an important source of differences in income.[43]

If (1) income from property as a whole fluctuates cyclically more than income from work and (2) the very high incomes hold larger shares in income from property than in income from work, the observed variations in inequality within the upper group are explained. During depressions, inequality will decrease because of the larger proportional decline of the top incomes; during prosperity, it will increase because of the larger proportional rise of the top incomes.

Both assumptions can be verified with the help of federal income tax statistics.[44] The verification undertaken here is confined to three years of a recent business cycle: 1929, 1933, and 1936. We define as the upper group people who filed income tax returns for these years, regardless of whether the returns showed a taxable net income. The recipients of the top incomes are defined as those who reported a net income in excess of $5,000. Table 26 supports the view that income from property varies more markedly than income from work, and gives mixed income an intermediate position.[45] The share of the top incomes is highest for the most flexible type of payment, lowest for the least flexible.

To explain why inequality within the upper group failed to decrease, indeed actually increased during the depression in some cities, especially in the tenant samples, the hypothesis might be advanced that income from property forms a different proportion of the total income of the upper group in the various cities and the two tenure groups. Where the upper group derives a larger proportion of its income from property, especially stocks, and a smaller proportion from work, the difference in cyclical flexibility shown

[43] See F. R. Macaulay, 'The Personal Distribution of Income in the United States', *Income in the United States* (National Bureau of Economic Research, 1922), II, 376 ff.

[44] See also Ch. 3, Sec. 3b.

[45] The analysis is not carried out for a constant proportion of the population, since joint income tax returns and other factors make it difficult to define exactly the population that corresponds to income tax returns. Moreover, such a correction would merely emphasize the tendencies discovered here. If, in order to reduce the number of returns in 1929 and 1936 to the population proportion of 1933, some of the lower incomes were omitted from the material for the two prosperity years, the difference in flexibility between income from property and from work would be even more spectacular; for the omission of these low incomes would subtract proportionately larger amounts from the latter than from the former. Thus the fluctuations in income from work would be reduced in relation to those in income from property.

by the two broad types of income is more likely to cause a decline during depression in income inequality within the upper group. Where income from property is insignificant, inequality within the upper group may not decrease during depressions or even increase.

The Financial Survey contributes little to the testing of this hypothesis. For 21 cities data were tabulated that show for each income group in 1933 the totals of (1) wages and salaries, (2) income from roomers and lodgers, and (3) other income. Unfortunately, similar data are not available for 1929. It is permissible to assume that 'other income' represents pure or mixed income from property, but not that the 1933 proportion of 'other' in total income measures the weight of the highly flexible types of property income in the various cities. For it is likely that, in the depression year, income from property consisted chiefly of the less variable types, i.e., interest, royalties, etc.; dividends and capital gains had, for the most part, disappeared. Thus the fact that the upper income recipients in a certain city received a relatively large proportion of their income from property does not mean that they were exposed to the equalizing effect of declining dividends and capital gains to a greater degree than the upper income recipients in another city with proportionately smaller incomes from property. Indeed, it may mean just the opposite: namely, that the upper group in the first city held a relatively minor share in the *flexible types* of property income and that therefore the sharp decline in these types of income did not reduce income inequality significantly. For all 1933 income groups together, as well as for almost all of the 1933 groups above $1,500 separately, owners in the 21 cities derived a greater proportion of their income from property ('other income') than did tenants.[46] If a greater proportion of property income in 1933 meant a greater proportion of cyclically flexible incomes, the hypothesis advanced above would be supported. However, as has been shown, such an interpretation is open to doubt.

To ascertain whether the proportion of 1933 property income in the total income of the upper group is correlated with the change in income inequality within it, 1929–33, in the 21 cities, we defined the upper group as the families in 1933 income classes with incomes above $1,500, and computed the correlation separately for tenants

[46] Exceptions: The proportion of other income is greater for tenants than for owners in Birmingham ($2,000-2,999), Birmingham and Trenton ($3,000-4,499), Des Moines, Richmond, Trenton, and Worcester ($4,500-7,499), and Butte, Peoria, Worcester ($7,500 and over).

and owners. The result is insignificant for both tenure groups: —.25 for tenants and .01 for owners. (Incidentally, no significant correlation exists between the proportion of property income for the upper group in 1933 and the degree of income dispersion, absolute or relative, in the same year.) Consequently, the hypothesis advanced above is not confirmed.

Even if confirmed, it would serve merely to explain why the downward tendency of inequality within the upper group differs in the various cities and between the two tenure groups. It would not tell us why inequality within the upper group increases in some cases. What is the nature of the factors that counteract the equalizing effects of depression on the income distribution of the upper group? It may well be that the recipients of high salaries—executives, technical and commercial specialists—are more successful in warding off salary cuts during depressions than minor officials and other recipients of moderate salaries.

In a study of executive employment and compensation in 100 industrial companies, 1928–32, J. C. Baker found: "(a) an amazing steadiness in the employment of executives, (b) an equally amazing steadiness in their salary, . . . (d) wide fluctuations in bonus payments; but not sufficiently wide to cause total compensation to decline as sharply as wages or dividends".[47] Baker's findings may account for the increase in inequality within the upper income group in some cities.

C DIFFERENCE IN INCOME LEVEL BETWEEN THE LOWER AND UPPER GROUPS

As we have seen, the relative difference between the mean incomes of the higher (upper 30-50 per cent) and lower (lower 50-70 per cent) groups of income recipients increases in depression and tends to decrease in prosperity. In other words, differences in income between the two groups are inversely correlated with the general level of income during short periods. A partial explanation may lie in the diverse effects of the rigid and flexible elements in the incomes of the two groups. It seems plausible that the flexible elements in the income of the lower group (employment and hours) is more important than those in the income of the upper group (primarily dividends and capital gains), and that in the former the rigid elements (wages of those who stay employed) are less important than in the income of the latter (salaries, interest). The explanations

[47] *Executive Salaries and Bonus Plans* (McGraw-Hill, 1938), p. 27.

advanced above for the fluctuations in inequality within the lower group can be brought to bear: part of the relatively stable incomes received by workers in the higher wage and salary groups who are employed fairly continuously comes within the upper section of the income distribution. When unemployment and wage decreases widen the income gap between the very poor and the moderately poor, they also widen it between the very poor and the moderately well-to-do. In addition, the most rigid incomes within the lower group may be flexible in comparison with the most rigid incomes within the upper group: in other words, the entire range of flexibility for low incomes may lie somewhat higher than the range of flexibility for high incomes. But here again we must remember that we are dealing with two groups that are not identical in composition during the two years of comparison. Some of the impact of cyclical flexibility may take the form of shifting a family from the upper to the lower income group, or conversely; rather than of shifting its position *within* the same income group, whether upper or lower.

It is not feasible here to attempt to account more specifically for the observed cyclical variations in relative differences in mean income between the lower and upper groups. The problem is extremely complex, involving simultaneous comparisons between the cyclical behavior of all types of income. The following observations may serve, however, as partial verification of the hypotheses that the more important unemployment is within the lower group and relatively rigid incomes are within the upper group, the more pronounced does intergroup inequality become in depressions.

Whatever the number of the unemployed, practically all will be in the lower income group. While the higher income group, invariably, is made up of employed persons and those receiving income from property, the lower group comprises a mixture of employed and unemployed. In bad times this mixture contains a greater proportion of unemployed, in good times, a smaller. The more unemployed there are in the lower income group, the greater, we may assume, is the relative difference between the income level of this group and that of the group with larger incomes. In the next subsection, we examine data that tend to support this hypothesis.

It will be remembered, on the other hand, that the tendency for inequality between the lower and upper groups [48] to increase in bad

[48] As measured by the share of the upper group in total income; see Ch. 2, Sec. 3a, and Table 19.

times has manifested itself more definitely the smaller the decrease, or the greater the increase, in income inequality within the upper group. Using the hypothesis advanced above for the changes in inequality within the upper group, we may say that the increase in intergroup inequality is greater the less important the highly flexible income from property and the more important the more rigid property income and salaries, for the top incomes of a city. Where flexible incomes constitute a relatively small fraction of the top incomes, the upper group as a whole experiences a less severe drop in income level than where they constitute a larger fraction. The income gap between the lower and upper groups is likely to widen more under the first situation.

d TENTATIVE VERIFICATION OF THE RELATION BETWEEN UNEMPLOYMENT AND INCOME INEQUALITY

The questionnaire of the Financial Survey of Urban Housing contained the following query: "About what proportion of his normal full working time was the principal income earner of the family employed in 1933?" [49] For the 21 cities covered by the Financial Survey we have the average percentage of time during which the principal earner was employed, for all tenant and all owner families that reported 1933 income. Correlations were computed between the average percentage of time lost by unemployment (100 = percentage of time employed) and the relative increases in two components of income inequality: inequality within the lower group and relative difference in mean income between the lower and upper groups (Table 27).

The impact of unemployment tends to be correlated positively with the relative increases in both components of inequality. Though not high, the correlation is statistically significant on the 5 per cent probability level in the three cases that show the larger coefficients of correlation.

These data lend some support to the theses set forth in Sections a and c. It may be assumed that unemployment in 1929 was negligible and that almost all unemployment in 1933 represented an increase over 1929. If this assumption is permissible, then the correlations indicate that inequality within the lower group and the relative

[49] No such question was asked regarding 1929, nor from tabulations can the 1929 incomes of individual families be related to the 1933 employment record of the principal earner.

TABLE 27

Coefficient of Correlation between the Average Percentage of Time Lost Through Unemployment in 1933 and the Relative Increase in Income Inequality

	INEQUALITY WITHIN THE LOWER GROUP	RELATIVE DIFFERENCE IN INCOME LEVEL BETWEEN THE LOWER AND UPPER GROUPS
Tenants	.429	.597
Owner-occupants	.860	.161

Computed for 21 cities. No published data on employment percentages are available for Boise, Erie, Lansing, Lincoln, Little Rock, Portland (Oregon), Racine, Sacramento, St. Joseph, St. Paul, Springfield, or Topeka.

difference in income level between the lower and upper groups tended to become progressively greater with expanding unemployment.